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ART. XXIII.—ADDRESS DELIVERED BEFORE THE GRADUATES OF THE PHILADELPHIA COLLEGE OF PHARMACY, APRIL 27, 1835. By FRANKLIN BACHE, M. D., Professor of Chemistry in the College.

GENTLEMEN, GRADUATES ELECT OF THE COLLEGE OF PHARMACY—I have been invited by the Committee of Arrangement, to address you on this interesting occasion. I regret that their choice did not fall on one more competent than myself, and whose leisure might afford the necessary time to do ample justice to the topics which may be appropriately presented for your consideration.

You are now about to commence a most arduous and responsible profession, after regular studies and due preparation. The knowledge which you have gained in this institution, and under your private preceptors, is now to be brought practically into play. You are about to undertake new and important duties, having relation both to yourselves and your fellow men, and to claim, in a new sphere of action, the enjoyment of certain professional rights. A few cursory observations on the nature of these duties, and the extent of those rights, may properly engage our attention on the present occasion.

The duties of the members of the pharmaceutical profession,

like those of the medical, relate to some of the most precious interests and concerns of the community. The restoration of health under the favour of heaven, the assuaging of pain, and the snatching of some beloved object from the danger and perils of disease, are alike the object of both professions; of the medical, in devising the means, of the pharmaceutical, in preparing those means with intelligence and conscientious accuracy.

The qualifications which should be possessed by the pharmaceutist, about to enter upon the practical performance of the duties of his profession, are of two kinds. First, sufficient knowledge to enable him to perform his duties aright; and secondly, that proper tone of moral feeling which will prompt him, knowing his duty, to perform it with conscientious fidelity. I shall venture to detain you for a short time, while I make a few remarks under each of these heads.

The knowledge necessary to the scientific apothecary is certainly very extensive; and hence it is requisite to assist his progress by systematic instruction from lectures, at the same time that he is attending to those practical duties which he performs in the service of his immediate preceptor. The want felt for such systematic instruction was the chief impelling motive which actuated those public spirited individuals who founded this College. Through the wise foresight, and enlarged views of your elder brethren of the profession, you have enjoyed the advantages of the instruction imparted in these halls, advantages which they themselves did not possess. Having complied with the rules of this College, you have now finished your elementary course. You have been found, on due examination, sufficiently instructed in the sciences connected with your profession, and have furnished the necessary testimonials to prove that you have gone through a regular course of practical duties, under the instruction of some established apothecary or druggist. Regularly instructed, therefore, in your arduous profession, you are this evening to receive its honours, and to hold that diploma from a chartered institution, which is to form the evidence of your successful studies, and to constitute the only proper basis of public confidence.

Being now deemed fit to enter into business for yourselves as graduates of pharmacy and master apothecaries, I need hardly guard you against forming any vain estimate of the sufficiency of your present knowledge, which would lead you to discontinue your studies. You are all aware, no doubt, that, in this College, you have been enabled to lay the foundation only of pharmaceutical science; and on that foundation, it is incumbent on you to raise the superstructure of diversified knowledge, if you wish to attain eminence and wealth. As apothecaries, therefore, in business, you must still continue to be students,—students indeed to the end of your lives.

If I may venture to throw out a few suggestions on the subject of the future prosecution of your studies, I would recommend to you to continue assiduously to cultivate the sciences of Chemistry and Botany. Even supposing your present proficiency in chemistry to be highly respectable, still, to keep pace merely with the discoveries in this science, requires that the chemist should be unceasingly a student. Botany also is a science which is constantly enlarging, and, as forming the key to the proper understanding of the vegetable Materia Medica, is of the highest importance. Works on these and other sciences, bearing more or less on pharmacy, should be constantly in course of perusal, to occupy profitably those spare hours which the wasteful of time are so apt to throw away. Besides a course of reading on these sciences, chemistry may be pursued by experimental researches, and botany, by excursions into the country, with a view to the recognition and investigation of our native plants.

As a key to the acquisition of the stores of knowledge accumulated in other countries in relation to his profession, the ambitious pharmaceutist will pay attention to foreign languages, in addition to the Latin, which is essential to the accurate comprehension of prescriptions. To this end, his first attention should be directed to the French, as being the most useful of modern languages. Next to it, the German deserves to be studied, as the language in which are written the most elaborate and extensive treatises on pharmacy. The study of these languages will form a delightful occupation for that leisure time which most professional young men, at the com-

mencement of their business, are apt to have upon their hands. After some facility in reading has been attained, further improvement may be made by reading pharmaceutical works in the respective languages; and thus important pharmaceutical knowledge and highly useful foreign languages may be acquired at the same time.

In accomplishing yourselves for the pharmaceutical profession, more particularly in case you should engage in the business of importing druggists, it will be incumbent on you to enlarge your knowledge as to the geographical sources and commercial history of drugs. Here then is required of you those diversified attainments which distinguish the enlightened merchant.

Lord Bacon has somewhere remarked, that every gentleman who engages in the exercise of a profession, enters into a tacit agreement with his brethren to maintain its honour and dignity, and to endeavor to improve it by new observations and discoveries. That you will maintain the ethical principles connected with your profession, and even raise their standard, I will not allow myself to doubt; but what I here wish particularly to call your attention to, is the obligation which you are all under, of exerting yourselves to enlarge the boundaries of your profession, by adding to it important facts and observations. You have received the pharmaceutic art, enriched with numerous discoveries, the result of the joint labours of those men who have adorned your profession, or distinguished themselves in the sciences subsidiary to it. How are you to repay the advantages which you have derived from this rich inheritance of knowledge, prepared to your hands? I answer, by assiduously adding to it, and by transmitting it to your successors, still richer and more valuable than you received it. In this way only can the debt of gratitude which you owe to your predecessors be repaid.

For entering upon this honourable career of investigation, with reference to improvements and discoveries connected with your profession, our own country presents several advantages. Our plants have as yet been but imperfectly investigated, with reference to their medicinal virtues. Many of them may possess peculiar active properties, not now sus-

pected, which may be advantageously brought to bear in the cure of diseases, in the hands of skilful physicians. Our native botany, therefore, forms a field, as yet but imperfectly explored, and which, when properly cultivated, will yield a harvest of important discoveries. Connected with the discovery of native plants, will be afforded the opportunity of investigating them chemically, with a view to separate their active principles, and thus to prepare them most advantageously for the use of the physician. Here then are incentives to exertion which might arouse the most indifferent, and opportunities for distinction which are not enjoyed in Europe, where the botany and chemistry of the indigenous plants have been so thoroughly investigated as to leave far less to be accomplished than with us.

I now dismiss my remarks on the subject of the obligation, which you are all under, of continuing still to improve yourselves in your profession, and of exerting your abilities to add something of importance to the stock of its knowledge; whereby you may honourably connect your name with the pharmaceutical art for all future time. Passing from these topics, I shall next make a few remarks on some ethical points connected with your profession, which may not be out of place in the present address.

The physician has the good fortune to possess a classical work on medical ethics, written by one of the brightest ornaments of the medical profession in Great Britain. It is to be regretted, that as yet we possess no similar treatise, expressly written on pharmaceutical ethics. This desideratum is yet to be supplied, and from the want of the assistance of such a work, the remarks which I may here make will necessarily be very imperfect.

The professions of medicine and pharmacy should carefully avoid invading the province of each other. In all well organized communities, the professions are in different hands; and while the physician should not exercise pharmacy, apothecaries should carefully avoid prescribing for diseases. In country situations, however, the physician is compelled to perform some of the simpler operations of pharmacy; and

his medical education, by including chemistry, botany, and materia medica, justifies him in this course. The pharmaceutical graduate, even though he may be in a country situation, is not deemed justifiable in practising medicine; because, in connection with the pharmaceutical branches of of his education, he has not studied anatomy, surgery, and the practice of medicine; subjects essential to be known by the humblest practitioner.

In all cities and large towns, the two professions, though kindred, should be held as perfectly distinct, and the practitioners of each should disdain to encroach on the domain of the other, feeling a just pride that their respective professions are sufficiently honourable to satisfy any laudable ambition for distinction, and sufficiently elevated in their objects, and in the character of the diversified attainments necessary for their successful pursuit, to form the exclusive objects of study of the most gifted intellects.

The legitimate objects of the pharmaceutical profession are chiefly two; first, to keep and accurately dispense all the officinal and standard medicines and preparations; and, secondly, to improve the mode of preparing articles of the materia medica, by the aid of the lights of practical pharmacy and chemistry.

The dispensing of medicines on pharmaceutical principles is, for the most part, accomplished in fulfilling the prescriptions of regular physicians. Many medicines, however, are necessarily disposed of independently of prescriptions; and when the sales are restrained by proper limitations, the course is perfectly justifiable. Thus the dispensing of simple medicines to the public at large, on their own requisition, could not be declined without interfering with that reasonable freedom of action which belongs to all persons. But the question assumes a different aspect when it relates to very active and poisonous preparations. To sell laudanum, prussic acid, corrosive sublimate, arsenic, and other dangerous substances in poisonous quantities, to whomsoever may apply for them, may cause deplorable mischief,—not merely great suffering and danger, but the loss of life itself. The conscientious

apothecary will take care how he makes himself accessary, however unintentionally, to the criminal purposes of the wicked or wretched, or to the disastrous mistakes of the ignorant. In many countries, the vending of these dangerous medicines is regulated by law; but in the absence of all legal provision with us to regulate the pharmaceutist in this respect, it will be proper for him to adopt the rule not to dispense any poisonous medicine, unless on the prescription of a regular physician, or on the written order of some responsible head of a family.

In recommending to the apothecary, as a legitimate object, to endeavour to improve the mode of preparing various medicines, I do not mean that he should attempt to fit them as *cures* for this or that disease; for to effect this would be impossible. But an article of the materia medica may not be prepared on strict chemical or pharmaceutical principles. Careful experiment and observation may show that the active part of a medicine is injured or destroyed by the ordinary mode of preparation; that inert matters are uselessly retained. instead of being excluded; that a wrong or injudicious solvent is employed, or, finally, that those expedients which may be properly resorted to, to cover the taste or to lessen the bulk of the medicine, have been neglected. When errors of preparation such as these, not to mention others, occur, it is the legitimate province of the pharmaceutist to correct them, and to present the active parts of a medicine in the most favourable state for administration by the physician. But he is not to go further, and experiment with it in different diseases, and then announce to the public at large, that it is a remedy for whooping-cough, for ague, or for any other disease. To do so would be doubly wrong,—intrinsically wrong, because it is impossible that any medicine, in itself, can be a cure for any disease; and professionally wrong, because it does not belong to the pharmaceutist to investigate the remedial virtues of different medicines. An individual thus attempting to exercise the professions both of apothecary and physician, gives proof not of the extent of his attainments, but rather of his presumption.

You perceive, gentlemen, that I make a distinction between improving the preparation of medicines on true pharmaceutical principles, and their investigation as curative agents. The former is the legitimate province of the pharmaceutist, the latter of the physician. It is impossible for the pharmaceutist, the physician, or any one else, to prepare a REMEDY; that is, a SOMETHING, which shall be such intrinsically, or in its own nature. By a remedy, I understand a medicine, which administered at a fitting time, in a proper dose, and under fitting circumstances, restores health, or promotes its restoration. Under this definition, every medicinal preparation is a remedy or the contrary, according as it is judiciously or injudiciously employed. I defy, therefore, the pharmaceutist, though bringing to the task the greatest skill, to prepare a single remedy. He may prepare a medicine, containing its admitted activity, in a convenient, permament, and invariable form; but after all, it may be an instrument for good or for ill, a remedy or the contrary, according to the use which may be made of it afterwards. Skill may make it the greatest of blessings; ignorance and presumption, a curse worse than famine or the sword.

Thus you perceive, gentlemen, that nothing but the skilful and appropriate application of medicinal agents constitutes them remedies. You may make scientific preparations; but you would require to be skilful physicians, and to apply these preparations skilfully, to make them remedies.

A crude idea is entertained by the ignorant that every distinct disease is an invariable something; and hence if they imagine they have noticed a particular medicine to cure a particular case of disease, they make a sweeping conclusion, that every indisposition which is called by the same name, must necessarily be cured by the same medicine. Such people justify themselves on the plea that they go on the safe road of *experience*; but, permit me to add, it is an irrational experience, not founded on enlightened views of disease. They little imagine that two cases of sickness, though in common parlance called the same disease, may differ widely in their character. and may require remedies not only different, but

diametrically opposite in their nature. A blind reliance on experience, without sufficient intelligence to appreciate its character and bearing, is called in modern acceptation *empiricism.* This word, according to its etymology, denotes a dependence on experience; and when experience is *justly* appreciated, and those analogies are *carefully* traced, by the light of which alone experience can be made available, then is such dependence on experience proper. But the term by modern usage is always taken in the sinister sense, of experience *falsely* appreciated, and *irrationally* applied; in other words, it is made synonymous with *quackery.*

Empiricism or quackery, as here explained, may be entirely the result of ignorance and its usual concomitant presumption; and the measures which it pursues do not necessarily imply moral turpitude. It is far otherwise, however, when an individual professes to depend upon experience which he knows to be ill-founded, and to rest upon analogies, which he is sensible all the while are fallacious. Here empiricism becomes charlatanry, and the ignorant but well-meaning pretender is converted into the crafty mountebank.

I trust I have said enough, gentlemen, to convince you that empiricism ought to be discountenanced by the pharmaceutical and medical professions, as a blot upon their callings, and as the cause of a vast amount of suffering to the community. According to the views which I have taken, no medicinal agents should be presented by either profession to popular attention as remedies for this or that disease; as doing so is equivalent to inviting ignorant individuals to quack on their own persons, or on those of their friends and neighbors. However boldly they may be called remedies, they cannot be such unless judiciously applied; and I am sure that no one will have the hardihood to assert, that the people at large can be taught the practice of medicine in a newspaper advertisement or a handbill.

As connected with the ethical principles of your profession, I have been led to notice empiricism as a fruitful source of involuntary error in professional conduct, if not of compromise between moral rectitude and self-interest. But to

give a full analysis of empiricism, to exhibit to you separately, all the ignoble elements which enter into its composition, would be a task far beyond my analytic powers.

The essential element in empiricism is the presenting of medicinal agents to popular attention as remedies in particular diseases, or classes of diseases. But it presents different cases, according to the circumstances under which the medicine may be brought before the public. The *first* case is where some well known medicine, or combination of medicines, is presented to public favour, with an artful introduction, setting forth that it possesses such and such remedial powers; as, for instance, that it will purify the blood, allay irritation, strengthen the nerves &c. &c. The advertiser may not, in this case, reap all the profits which the sale of the medicine may produce; but the amount of harm which the popular appeal will cause, will not be lessened thereby; for this will be precisely in proportion to the number of blunders which it may induce individuals to commit in applying the remedy to themselves. In the case here supposed, it matters not whether the medicine is popularly known under the name of some physician, either living or deceased: it may even be a medicine prepared on correct pharmaceutical principles; still the objection remains, which is not to the medicine intrinsically, but to the *craft* of asking the public at large to become their own doctors.

A *second* case of empiricism is where a combination is prepared by some physician or apothecary, and, though the *receipt* by which it is made is not exactly known, its *ingredients* are mentioned to both professions, or perhaps the proportions are communicated confidentially to a few physicians, to remove their scruples to its use. Now I am willing to suppose that such a combination may be made on correct pharmaceutical principles; that it is active, without being dangerous from the minuteness of its dose. I am ready to admit, moreover, that in skilful hands it would prove a remedy. But in the hands of such unskilful practitioners as the public at large, it cannot fail to do much more harm than good. Here also, the objection does not lie intrinsically to

the medicine, but to the disingenuousness which takes advantage of popular credulity for the sake of gain.

A *third* grade of charlatanry is where a popular appeal is made in favour of the curative powers of a medicine in certain diseases, the exclusive right to prepare which is secured to an individual by a patent. Here the objection already stated applies, that the medicine patented is a remedy or the contrary, according to the judgment with which it is given.

But it may be asked, whether,—in case a pharmaceutist makes a discovery as to the best mode of extracting the active principle of a plant, or of rendering it soluble or free from liability to change,—it is morally wrong for him to obtain for such discovery a patent, in order to secure to himself the reward of his science, industry, and ingenuity. I answer, certainly not, if the process be candidly and fully set forth in the application for the patent, and the product be addressed to the medical profession through the scientific Journals, and not to the public at large, as a cure for this or that disease, which, in the nature of things, it cannot possibly be. This statement may be considered as embracing the abstract ethical principles relating to the obtaining of patents for pharmaceutical improvements. But when it is considered how difficult it would be to prevent others from adopting the improvement without the consent of the patentee, and how likely it is to happen, that the medicinal substance, in its improved form, would fall into the hands of the public, under a mistaken notion that it was a remedy, instead of being merely an improved instrument to be wielded by the skilful, it will be readily admitted that such a patent would prove useless to the possessor if honest, and liable to great abuse. Finding, then, the subject of patents for pharmaceutical improvements beset by such practical and unavoidable difficulties, I have come to the conclusion, that the reasonings which justify the granting of these exclusive privileges in the mechanic arts are not applicable here; and that the high-minded pharmaceutist, like the high-minded physician, taking into view the sacred object of his profession, will feel himself

bound to throw open his discoveries for the good of his fellow men.

The *fourth* and last case of quackery which I shall mention, is where a medicine is boastfully presented to the public as a cure for various diseases, and its composition and preparation are at the same time kept secret. Medicines which are thus kept secret are denominated *Nostrums.* In this case, as in the others, empiricism is evinced by presenting a substance as an invariable cure, and by appealing to the public at large, as if they were judges on medical subjects. But there is superadded to this, the crafty device of enveloping the medicine with mystery. This mystery gives currency to the nostrum, and creates, in many, a blind faith in its powers; and, as a consequence, the proprietor reaps a proportionably large harvest of money and public contempt. He declines making his secret public, from the sordid motive that by so doing he will lessen his profits. But why will publicity lessen his profits? Will it be because, by revealing his secret, every one may make his medicine, and enter into competition with him? By no means; it will be for quite a different reason—it will be because his medicine, stripped of the mantle of mystery in which it is wrapped, and exposed in its native insignificance, will cease to be used at all!

Such, gentlemen, is a brief analysis of that disgusting compound called empiricism. I have exhibited to you its several component parts, which, I admit, are not all equally disreputable and censurable. Some of them, indeed, are excused or justified on the various pleas of the usages of trade, and of the right of the people to have themselves deceived, if it is their sovereign will and pleasure. It is to guard you against these plausible arguments that I have thought it proper to speak of empiricism; for I am sensible that it could not be necessary to caution you against those gross arts of deception which characterize the worst ingredients of quackery.

It must be admitted that the young apothecary, just entering upon the practical exercise of his profession, is beset by several perplexing difficulties, between the claims of his business as a means of support, and his views of moral right,

which may be inconsistent with his pecuniary interest. The great defect here is the want of precise rules for regulating the conduct of the pharmaceutical body; a want which discourages those individuals who desire to adopt a high standard of professional morals. This College, it must be conceded, has done much on the score of regulations; still, much remains to be done. Upon reviewing the points of conduct censured in this address, I think the apothecary can and ought to avoid them. The question, however, is a more difficult one, how far he may permit himself to be accessory to the arts of empiricism by vending secret and patent medicines. Here I would advise, that, in accordance with truth and the lights of science, you should take every proper opportunity, in conversation, of disabusing the minds of the unwary, of the prepossession which they may entertain in favour of these preparations; and that you should decline becoming agents for the proprietors, and avoid announcing them by show-bills in your stores, or by advertisements in the newspapers. But if your customers, or others, are obstinately bent on using these medicines, and wish to be supplied by you, it cannot be expected that you should decline furnishing them. If you were to do so, you would give offence, injure your business, and do no good to the applicant, as he would unquestionably provide himself elsewhere. But thus reluctantly to yield to the prejudices of the people from unavoidable necessity, is a very different thing from taking every possible method of increasing the consumption of these objectionable preparations. On this point, therefore, of pharmaceutical ethics, I conclude that the *present* state of your profession in this country will justify you in keeping secret and patent medicines to such an extent as may be necessary to supply your customers, provided that you discourage their sale as much as lies in your power.

With regard to certain patent medicines, (so called,) the composition of which is regulated by standard receipts, I have only to remark, that some of them are valuable pharmaceutical combinations; and the objection lies to them, for the most part, on account of their activity, which makes

them agents for good or for evil, according to the judiciousness of their application. Now, as this application is made by the public at large, who are ignorant of the nice principles on which the practice of medicine is conducted; it will be readily conceded, that such medicines, in their hands, will much oftener be the instruments of evil than of good.

Another difficulty which the young pharmaceutist has to contend with is, that he is often solicited by the poor and parsimonious to prescribe. The ignorant people who do so, cannot be made to comprehend, that the pharmaceutical and medical professions severally embrace within their scope, such diversified science, that it is hardly possible that the same individual should have a competent knowledge of both. I need hardly remark here, that no apothecary is permitted, according to the rules of his profession, to pay a visit to a patient in order to prescribe. This would be a palpable interference with the rights of another profession. But frequently, in slight cases, a person applies personally at the shop of an apothecary for some medicine which may relieve him. To decline peremptorily to afford any advice, might give offence; and instead of inducing the applicant to resort to a physician, would throw him on his own crude medical resources. Now, from the very nature of the pharmaceutical profession, its members must possess much general intelligence on medical subjects, as well as exact knowledge of the doses of medicines. In the case supposed, therefore, it would be justifiable in the apothecary to give his opinion, and advise some simple medicine; in many instances correcting the views of the ignorant applicant, both as to the appropriate remedy, and the proper dose in which it should be given. In thus admitting the propriety of an apothecary's prescribing in slight cases, where refusal to do so would be productive of no good, but perhaps harm, I feel bound to advise you to avoid doing so whenever it is in your power. Nothing could be further from my views than that you should aim at being medical practitioners, influenced either by the

sentiment that it would confer distinction, or by a desire of making it a means of increasing your sales.

It will be readily conceded, that all well educated pharmaceutists must possess a stock of ideas on medical subjects, far greater than that possessed by any other class of persons out of the medical profession. If they use this knowledge discreetly and not obtrusively, with no disposition to trench upon the ground of a kindred profession, and without exacting fee or reward either directly or indirectly, no possible objection can be raised to the course. I feel satisfied that much good is done by the intelligent apothecary in correcting the crude notions of the public on the subject of proper doses; and I am equally clear that they should interpose to prevent an ignorant person from prescribing an obviously inappropriate medicine for himself. Nay, I would go further and say, that the pharmaceutist should possess such general intelligence on subjects connected with his profession, as to enable him, in cases of extreme emergency, when medical aid cannot be had, to interpose with judgment and efficiency. Cases of poisoning furnish examples of such emergency, wherein the loss of a few minutes is often attended with fatal consequences. A knowledge of antidotes, therefore, should form a part of the attainments of the accomplished apothecary. These substances act on chemical principles; and the apothecary, viewed as a chemist, is bound to understand the principles on which they operate, and the modes in which they should be applied.

There are still a number of topics, touching the duties and responsibilities, the rights and the wrongs of your profession, on which I might dilate, were I not admonished by the length of this address, that it is time to bring it to a close. In laying down principles for the guidance of your professional conduct, my aim has been not to present to your acceptance any over-strained rules; but such only as are applicable to the condition of pharmacy in this city. I wish you not to take any of my opinions on trust, but to examine for yourselves. Such of my ethical rules as, upon reflection, you may be *convinced* are well founded, you are bound to act up to. If any of them should be deemed erroneous, then I declare, that such is my respect for opinion, honestly enter-

tained, that my feelings of respect for any of you would not be lessened, should you act on different principles from those which I have laid down. But permit me to add, that, in case you are in *doubt* as to the moral propriety of any particular line of conduct, you are *bound* in prudence to *abstain* from pursuing it. In such a doubtful case, it cannot be immoral to abstain; while to take a contrary course, may cause you to lose your self-respect; a loss which no worldly gains can possibly repair.

In conclusion, gentlemen, allow me to remind you, that having honourably completed your professional studies in this College, you are about to enter upon the theatre of the world, as conductors of an important business, and as citizens. It is highly important that you should commence your career, animated with correct principles. It is on this account that it is incumbent on you to decide in the outset, on the course of professional conduct which it will be proper for you to pursue.

But I cannot allow myself to close this address, without calling to your mind the debt of gratitude which you owe to this College. This you are bound to repay by all the means in your power, by striving to distinguish yourselves in your profession, and by giving the laudable objects of the College your warmest support. I would also recommend to you to exert your influence with your young friends who are studying pharmacy, not to be satisfied with receiving the instructions of the College, but to imitate your example, and, by honourable proficiency, win its *diploma*. The College, on its part, feels interested in your success, and will protect your rights, and promote your welfare, as far as their influence as a body may extend. For my colleague and myself, I can only add, that we shall continue to feel, as heretofore, a lively interest in your advancement: and now, at the moment when we are to exchange the relation of preceptor and pupil, for that of fellow citizens of the same community and members of kindred professions, we offer you our gratulations on the honours you are about to receive, and beg you to accept our warmest wishes for your health and prosperity.

ART. XXIV.—ANALYSIS OF A WHITE POWDER FOUND IN A HORSE TROUGH, SUPPOSED TO BE POISON.

By P. T. Tyson and Wm. R. Fisher, Associate Member of the Philadelphia College of Pharmacy.

The quantity submitted for examination is about one grain. It is white, not granular, and apparently free from organic matter. The quantity found and sent is so small that but a very minute portion can be allowed for experiment. It has not the appearance of arsenic or corrosive sublimate, but rather that of a vegetable powder; to determine promptly whether the latter were the case, a small speck of it was heated on a platina spatula, over a spirit lamp; copious white fumes were given off, and a very minute speck of carbonaceous matter left; this at once determined the belief of its being a mineral substance, mixed with a small proportion of vegetable matter.

A regular series of experiments was now commenced, as follows:

About one-third of the whole quantity was mixed with charcoal and carbonate of soda, and exposed in a tube to the heat of a spirit lamp, for reduction. A white crystalline sublimate was found lining the tube, invisible by transmitted light; only seen by reflection. It was evident from this that there was *no arsenic*. The appearance indicated mercury.

2d. A fresh portion of the powder was dissolved in a watch glass, in muriatic acid; the excess of acid being neutralized by caustic potassa; hydrosulphuric acid was added, and a black precipitate fell—bisulphuret of mercury.

3d. The reducing tube being divided just above the flux, and the lower end of the superior portion sealed, one or two drops of nitric acid was poured into the tube, and the sublimate (No. 1,) was dissolved; about twelve or fifteen minims of water were added, and a complete solution formed. This solution, acted on by the following reagents, gave the annexed results:

A. One drop, placed on the back of a gold watch, and a galvanic circle formed by the blade of a penknife, gave a

large, bright spot of reduced mercury, which formed the usual amalgam.

B. Another drop of the solution on glass, over a spirit lamp, was evaporated, and the heat being increased, an orange red residuum was left—red oxide of mercury.

C. To a few drops of the solution, a solution of hydriodate of potassa was added, on a piece of glass; a greenish yellow and brilliant red precipitate, partially blended, were formed—the iodide and per-iodide of mercury.

This series gave convincing proof of the presence of mercury, but the question was still, whether calomel or corrosive sublimate? The following experiment satisfactorily solved that, and the character of the powder was fully established.

4th. The remaining portion of the suspected powder was placed near the lower end of an open tube, and the heat of a spirit lamp applied. Almost the whole substance was sublimed, and condensed on the upper surface of the tube, in a beautiful *pearly white* powder. As in the first experiment, a small carbonaceous residuum remained.

A. Liquid potassa added to this, gave a black precipitate—black oxide of mercury.

B. Lime water placed upon it, also gave a brownish black precipitate—black oxide of mercury.

The difference in the shades of the black oxide of mercury precipitated from calomel by these respective reagents, is familiar to all chemists and pharmaceutists, and no shadow of doubt was left that the powder left with us for examination was calomel,—proto-chloride of mercury.

We have been thus minute in the detail of our experiments, from having frequently felt the want of minuteness in the descriptions of and directions for analysis, given in the text books. Our experiments were all accomplished by the aid of a small tube, spirit lamp, three or four watch glasses, and the back of a gold watch and penknife. In no case was more than two drops of the solution employed, and for each series of the experiments not more of the powder, in bulk, than one-third of a grain of calomel was at our disposal. What a

valuable science, then, is ours, which, from materials so scant, can furnish results so important, with all the certainty of demonstration. Had the suspected matter been arsenic or corrosive sublimate, the result would have been equally certain, and perhaps a discovery been developed by collateral circumstances, which would have brought to punishment the author of the base deed; or, as in this case, some unjustly suspected person been relieved from the foul suspicion of having intended the death of a noble animal, by the clearness and distinctness with which chemical analysis had demonstrated the absence of all ground for suspicion. We offer these remarks to induce all those who may in any way be liable to be called upon to act as analysts, to qualify themselves for the duty, and to render themselves competent, by nicety and skill, to exhibit the components of the smallest specimens, with perfect accuracy.

Baltimore, May 29th, 1835.

ART. XXV.—MINUTES OF THE ANALYSIS OF BREAD, WHICH HAD CAUSED THE SEVERE ILLNESS OF FOUR PERSONS, AND DEATH OF TWO, IN FREDERICK COUNTY, Md. By P. T. Tyson and W. R. Fisher.

A roll of bread (suspected to be poisonous,) was handed to us this day with a memorandum relating thereto, sent by Dr. Goldsborough, of Frederick. The results of the examination were as follows:

First. A few crumbs of the bread placed on ignited charcoal gave a slight odour of arsenic; the accompanying empyreumatic smell proceeding from the combustion of the bread itself impaired the value of this experiment, but there was sufficient arsenical odour to create a suspicion of the presence of arsenic.

Second. About one third of the roll was placed in an evaporating dish on a sand bath and treated with nitric acid in

excess, with a few drops of muriatic and evaporated to dryness, for the purpose of destroying the organic matters.

Third. The residuum treated with boiling water and the soluble portion filtered off, was clear and slightly coloured.

Fourth. A small portion of the solution was treated with lime water, and gave a white precipitate.

Fifth. To another small portion, ammoniated sulphate of copper was added, and gave an apple green precipitate, the colour was considered very characteristic of arsenite of copper.

Sixth. The precipitate No. 5, was separated and dried, and with a portion of soda was exposed on charcoal to the reducing flame of the blow pipe. Copious white fumes were given off, having the peculiar odour of arsenic.

Seventh. The remaining and principal portion of the liquid (No. 3,) was acidulated with muriatic acid and treated with sulphuretted hydrogen, which produced an abundant yellow precipitate, which was heavy and soon subsided to the bottom of the glass.

Eighth. The precipitate from the last (No. 7,) was separated from the supernatant liquid, and a small portion reduced on charcoal precisely as No. 6; at first the fumes of arsenic came off mixed with the sulphur volatilized along with it. But towards the close of this operation the well known fumes of arsenic came off apparently pure.

Ninth. The remaining portion of the precipitate from No. 7, was submitted to the reducing experiment in glass tubes. When the heat was applied there arose, first yellow sulphuret of arsenic, which attached itself to the upper parts of the tubes; next the red coloured sulphuret, which attached itself a little below, and lastly the metallic arsenic, which attached itself in small scaly crystals just at the lower surface of the red sulphuret.

Several of the experiments here mentioned are alone sufficiently conclusive to satisfy the chemist of the presence of arsenic, but taken altogether, they form a mass of testimony derived from different processes which clearly places the fact beyond the possibility of a mistake. The precipitate No. 7,

weighed two grains, equal to one and a half grains white arsenic, but no doubt a half a grain or more must have been wasted, which would be two grains of white arsenic, in about one-fourth of the roll; so that the whole roll must have contained at least eight grains of white arsenic. The memorandum of Dr. Goldsborough stated, that an individual in the neighborhood was suspected of having designedly introduced poison into the bread; but a few days after the above account was written, it was ascertained that arsenic was put into the bread by mistake, instead of sal æratus.

ART. XXVI.—ON CORNUS FLORIDA.

By James Cockburn, Jr.

(Extract from Thesis. Phil. Coll. of Pharm.)

The Dogwood, or Boxwood as it is commonly called in the New England states, is found in all parts of the United States: but it is most abundant in the middle sections. It flowers early in the spring, being covered with a profusion of large white blossoms, which render it one of the most conspicuous and beautiful ornaments of our forests. The bark is the officinal portion, and is derived for use both from the stem and branches, and from the root. The bark of the root is preferred. It is brought into market in pieces of various sizes, usually more or less rolled, sometimes invested with a fawn coloured epidermis, sometimes partially or wholly deprived of it; of a reddish gray colour, very brittle, easily pulverizable and affording a grayish powder tinged with red. It has sometimes a large percentage of the wood of the root mixed with it, which may be considered an adulteration. The odour of dogwood, is feeble in the dry state, but rather aromatic when fresh or moist; its taste is bitter, astringent, and slightly aromatic. The fresh bark has rather an acrid and less bitter taste than the dry. Several different samples of the bark which I had an opportunity of observing, possessed the bitter

qualities of the best varieties in very variable degrees, perhaps owing to their inferiority to the mode and time of collecting, or to the manner of drying and preparing. The decoction is officinal in the United States Pharmacopœia, and is a good mode of administering the bark; it is made by boiling ℥i of the bark in Oi of water for ten minutes and straining while hot.

Cornus *Florida* is tonic and astringent, and is thought to possess remedial properties closely analogous to those of Peruvian bark, for which it has occasionally been substituted with advantage. It has long been employed for the cure of intermittents, and still holds a favourite place in the list of domestic remedies. According to Dr. Walker it was found, when taken internally, to augment the force and frequency of the pulse, and increase the heat of the body. The decoction is the preparation so much in use among the country people.

Dr. Barton also states that a decoction of it has been found very useful in a malignant fever called the yellow water, Canada distemper &c. which has been found very fatal among horses. The ripe fruit or berries if infused in spirit or brandy, are said to make a very agreeable bitter.

The Indians employ an infusion of the flowers in intermittents. The same infusion has been much recommended by some in flatulent colic.

The bark, though generally kept in the shops, cannot be said to rank among the indigenous remedies in common use, being now principally in the hands of domestic practitioners.

The length of time this article has been in use, we might suppose, would induce the expectation of a more satisfactory analysis than any with which we are acquainted.

It is nevertheless asserted by some individuals, that they have obtained a crystalline substance from this bark, and they seem content with the mere fact of having isolated what they consider the active principle, without ever making known its chemical properties, or publishing for the benefit of science, the process which they followed, as all real inquirers after scientific truths would have held themselves bound to do; and as such we cannot take for granted any thing, and of course, do not feel disposed to give credit to that which has not

been satisfactorily demonstrated: and as has been observed, "surely they can have a very limited desire for the progress of that branch of science with which their interests are so closely allied, who would for a moment withhold any information that would tend to cultivate a spirit of research among the pharmaceutical profession; however small the amount of information communicated might be, it would still constitute an accession to the general mass, and as such, would not fail to produce its good effects."

With a desire of making known the actual constituents of this substance, I have been induced to venture the result of a few experiments, which will not be characterized by the accuracy and precision, or by that originality of research which should be the aim of the analytical investigator; and for the many imperfections, of which I must beg to be considered as an apology, the very few facilities under which I unavoidably operated.

Experiments.—The decoction, which was of a light red colour, and slight mucilaginous appearance, formed a precipitate with a solution of subacetate of lead, which consisted of gum, colouring matter, and other foreign substances. A precipitate was also formed with pure alcohol.

Upon the addition of water to the tincture, concentrated by evaporation, it threw down a curdy precipitate, which, upon examination, was found to be resin.

The decoction and tincture redden litmus paper, and cause a yellowish precipitate in a solution of gelatine, and one of a dark olive green in a solution of sulphate of iron. They also afford precipitates with sulphuric and muriatic acids, lime water, alumina, the carbonates of ammonia and potassa, tartrate of antimony and potassa. The colour becomes lighter on the addition of nitric acid, milky by the corrosive chloride of mercury, and has its colour deepened by ammonia.

A portion of the bark was digested in sulphuric ether for a few days, and filtered. The etherial tincture was of a lemon colour and reddened litmus paper, and on evaporation deposited on the sides of the vessel a fatty matter, insoluble in water, but soluble in alcohol, leaving a greasy stain upon paper;

besides this, there was a compound of oil and resin combined with colouring matter, and a substance of a light brown colour, very bitter taste, friable and very regular appearance, supposed to be a compound of a peculiar bitter principle, mixed with tannin and other matters. This was dissolved in alcohol and formed a beautiful red coloured tincture, which reddened litmus paper. Lime was then added, boiled, filtered and evaporated; a substance resembling the etherial residue remained interspersed with small, shining acicular crystals of a bitter taste, which property I am disposed to believe they owed to the bitter extract with which they were associated. The bark used in the last experiment was submitted to the action of boiling ether, which on cooling, deposited a substance of the consistence of wax which it resembled in all its properties.

Two ounces of the bark coarsely powdered were introduced into ℥viii of alcohol and exposed to a temperature of from 105° to 120° F. The alcohol was then decanted and a fresh portion added and treated as before. The liquors were then united, and a solution of sub acetate of lead added to separate the colouring matter: after the insoluble portion subsided the clear liquor was separated, a little sulphuric acid was then added to the solution to separate any excess of sub-acetate of lead. This was filtered, and the alcohol distilled off. There remained in the retort an oily like substance together with a principle of a dirty white colour, curdled appearance, resembling the residue of the etherial tincture. Ammonia was then added to the liquor to precipitate any principle remaining in solution. The residue was then treated with a little sulphuric acid, water, and animal charcoal, (previously treated with muriatic acid,) which upon evaporation deposited an abundant crystalline mass of a flaky appearance, resembling at first sulphate of quinine, but on cooling assumed a feathery appearance with a sharp saline taste, soluble in hot and cold water, insoluble in alcohol and ether, soluble in nitric acid, and resembled sulphate of ammonia in all its properties.

One pound of coarsely powdered bark was boiled for half an hour in one gallon of water acidulated with ℥iss sulphuric acid.

The tincture was poured off and treated with animal charcoal and when evaporated left a brown extract of a resinous waxy appearance, and very bitter taste, which appeared to have very much the flavour of Peruvian bark; this was again treated with animal charcoal and left, on evaporation, a crystalline mass in an impure form, which was slightly soluble in alcohol, almost insoluble in ether, but very soluble in nitric acid. The alcoholic solution was evaporated and left crystals of a very fine, long, flexible, and silky appearance: which crystals decomposed when thrown upon red coals, and did not form a precipitate with oxalate of ammonia, but were without taste.

The bitterness was entirely owing to the bitter extract, which was slightly soluble in water, soluble in alcohol, but nearly insoluble in ether. This I propose to call bitter extractive, and in this I am inclined to believe the active principle resides.

A concentrated tincture yielded by evaporation a dark brown extract slightly soluble in water, soluble in alcohol and ether, bitter aromatic taste, possessing the properties of resin. Both this and the watery extract possess the sensible properties of the bark in a concentrated form.

There is a red colouring principle in this bark, taken up very feebly by alcohol and ether, but less so by water, and has its colour rendered deeper by an alkali.

One thousand grains of the bark yielded, by incineration, a product weighing sixty-five grains: this residue was submitted to the action of boiling water, and concentrated by evaporation: it then had an alkaline taste, effervesced strongly with acids, and restored the blue colour to litmus, previously reddened by an acid; it was then neutralized with nitric acid, and upon evaporation yielded crystals of nitrate of potassa.

The insoluble residue of the preceding experiment, was dissolved by nitric acid, (with the exception of a minute portion of carbonaceous matter,) with violent effervescence; the colourless solution thus obtained threw down a white precipitate on the addition of oxalate of ammonia, and a deep blue one with ferrocyanate of potassa. It produced also a dark green or black with tincture of galls. Carbonate of soda when

added to the solution caused a white flocculent precipitate. On adding a solution of phosphate of soda, no change was observable, but when ammonia is added, a white precipitate was immediately produced, which led to the belief that a salt of magnesia was present.

From the result of these few and imperfect experiments we may venture to enumerate the following, as among the principal constituents of the *Cornus Florida.*

1, Gum. 2, Resin. 3, Tannin. 4, Gallic acid. 5, Oil. 6, Fatty matter. 7, A crystalline substance. 8, Bitter extractive. 9, Wax. 10, Red colouring matter. 11, Lignin. 12, Potassa. 13, Iron. To which may be added salts of lime and magnesia.

It will be seen that these experiments have not led me to any decided conclusion as to the nature of the active principle of *Cornus Florida*, or the form in which it exists in the bark. The peculiar bitterness of the bark, seemed to be developed to a considerable extent, in the etherial extract: but more fully in the bitter extractive, than in any other form that came under my observation. Dilute alcohol appears to be the best solvent.

The bark was also treated by several other processes, but with no satisfactory results; which were not deemed of sufficient importance to be mentioned in this place.

ART. XXVII—MEDICO-BOTANICAL NOTICES—No. VI.

African Guaiacum. Under the name of *Guaiacum Afrum*, LINNÆUS described a tree belonging to the natural order of Leguminoseæ, found in some parts of Africa and possessing most of the properties of the *G. officinale.* The wood is hard, veined and brown, and is much used among the natives of the country as an antisyphilitic. This plant has been placed in a variety of different genera by botanists. Thus MEDICUS terms it, *Theodora speciosa*, and JACQUIN has figured it under the name of *Schotia speciosa*, (*Icon. rar.* 1. t. 75.) in which he is followed by ANDREWS, (*Bot. Repos.* 348.)

Winter's Bark. Mr. WEBSTER, a surgeon in the British navy, in his valuable "Narrative of a Voyage to the Southern Atlantic Ocean," gives some very interesting medico-botanical information, which we take this opportunity of laying before our readers. He states that at Staten Island, near Cape Horn, the *Winterana aromatica* (*Drymis winteri*) is common. He describes it as an evergreen, having the appearance of a laurel, sometimes attaining a very considerable magnitude, even that of twenty feet in circumference. The general height however is only eight to ten feet, and the stem small. It is of very quick and rapid growth, the wood soft. Its leaves are very similar to those of the laurel, and the flowers which are small and white are furnished with long peduncles. The corolla is of eight petals; the stamens numerous, crowded, the germs one, two or three, swelling, globose; the berries are green, one celled, oblong, containing a glistening powder and three or four black seeds. The bark is hot, pungent, slightly bitter and astringent; its flavour is durable and somewhat unpleasant. Water scarcely extracts its virtues; a mild tincture has very much the flavour of porter. The sealers often use the dried bark as a substitute for cannella.

New Rhubarb. Mr. WEBSTER says that a small plant was very common throughout the same island, the leaves of

which when dried had such a strong taste and smell of rhubarb, that he tried its effects and found it a mild aperient, and seeming to possess all the virtues of the best rhubarb. Its habitude, he goes on to say, appeared to be different, but he thinks that it belongs to the genus *Rheum* and proposes the name of *R. humilis* for it. The root was more strong and active, and in every sensible effect equalled the best rhubarb.

Milk Trees. The first account we have of these trees was given by Humboldt; he met with it in the Cordilleras, in arid situations. In the fourth volume of his "Personal Narrative" he says, "on the barren flank of a rock, grows a tree with coriaceous and dry leaves; the large woody roots can scarcely penetrate into the stone. For several months of the year not a single shower moistens its foliage. The branches appear dead and dried; but when the trunk is pierced, there flows from it a sweet and nourishing milk. It is at the rising of the sun that this vegetable fountain flows most freely; the blacks and natives are then seen hastening from all quarters, with large bowls to receive the milk, which grows yellow and thickens at its surface." He further states that it is called *Palo de vaca* and *Arbol de leche.* This tree which Decandolle thought might belong to the family of Sapoteæ, was placed by Kunth among the Urticeæ, under the name of *Galactodendrum utile.* Since this Mr. Lockhart, director of the botanical garden at Trinidad, found other milk trees in the Caraccas. Mr. Don, who examined the flowers of this species, states that it belongs to the genus *Brosimum,* nearly allied to Ficus.

Another milk bearing tree has also been discovered in Demarara, by Mr. Jones Smith; it is called *hya* by the natives, and is perhaps the *Tabernæmontana utilis,* Arnolt. It is to this latter, in all probability, that Mr. Webster alludes; it occurs near Para, where it is known under the name of *masaranduba.* Mr. Webster has called it *Vaccodendron lactifera.* He says it is among the loftiest in the forest, being one hundred feet and upwards in height. The bark is of a brownish colour, the leaves large and ovate. It flowers in

February, and produces a delicious edible fruit, like strawberries and cream. The fruit is ripe in April, and contains from two to four seeds. The milk is a rich, white, bland fluid, without odour, and of the taste and flavour of common milk. It mixes readily with tea and coffee, without curdling or undergoing any change, and in every respect seems like cow's milk. Boiling water does not alter it. It keeps unaltered six or seven days at a temperature of 85°. In fourteen days, Mr. Webster goes on to say, it evolved a sour odour, but had not coagulated; a gummy pellicle adhered to the cork. Some vinegar was added to the recent fluid without producing any immediate change; in forty-eight hours it acquired an unpleasant odour. Bicarbonate of soda thickened it a little, and in forty-eight hours produced a separation into a watery and creamy mass, the latter on the surface. A spirituous solution of bichloride of mercury thickened it a little, and seemed to produce a pellicle of gummy matter. Sulphate of iron thickened it and discoloured it slightly. Diluted sulphuric acid produced no immediate effect. Some, which Mr. Webster kept for a length of time, separated into a sourish milky water and a white solid mass, which, when taken out of the bottle and dried in the air, was a white inflammable substance, not softening at the temperature of the body; melting at 143°; tasteless, insoluble in water and spirits, and resembling white wax more than any other substance to which it could be compared. It burnt with a bright and agreeable flame, without smell, and was neither greasy nor resinous. This tree affords a most valuable timber for ship building, and is used for that purpose at Para.

Mirabilis Jalapa. This plant, so well known in our gardens under the name of "Four o'clock," was supposed for a long time to furnish the jalap of the shops, which article it approaches in medical properties. Chamberlain says, that in doses of forty grains, it operates freely on the bowels, but according to Devaux, this effect is uncertain, even in doses of two drachms, (*Journ. de Bot.* vi. 202.) Coste and

Willemet, however, state that the alcoholic extract acts powerfully. Mr. Webster tells us that at Para, a starch or fecula is prepared from the roots, which is used as a mild laxative for infants, being made the same as arrow root or panada; it has scarcely any flavour.

The seeds consist almost entirely of a pure and delicate farina, used by the ladies of Para to powder their faces, for which purpose it is also employed in Japan according to Thunberg.

Tonka Beans. The tree producing these, is a native of many parts of South America, where it is called *coumarou* by the natives. It is the *Courarouna odorata.* Aublet. *Baryosma Tongo.* Gærtner non Rœmer, and the *Dipterix odorata.* Willdenow. The bark and wood are said to be used as a substitute for guaiacum; the seeds, which are principally employed to give an agreeable scent to snuff, abound in a crystalline substance which is allied to benzoic acid, but according to Guibourt, who calls it *Coumarine*, differs from this acid in many respects; his views are confirmed by M. M. Boullay and Boutron Chalard. Vogel and Dr. Paris, however, state that it is perfectly identical with that substance. Mr. Webster says that they are procured in vast quantities in the woods near Para; and when kept long, a quantity of white crystals spontaneously form on them in such abundance, that a merchant of that place had a bushel of this crystalline substance. The beans yield an odorous essential oil by distillation, but on expression only a bland fixed oil, resembling that from almonds. The tincture is exceedingly fragrant. R. E. G.

ART. XXVIII.—REPORT TO THE BOARD OF TRUSTEES OF THE COLLEGE OF PHARMACY OF THE CITY OF NEW YORK, ON AN ADULTERATION OF ACETATE OF MORPHINE, &c.

Your committee of inspection respectfully report, that a specimen purporting to be acetate of morphine, was submitted to them by Mr. William L. Rushton, and said to be part of the contents of the same vial of spurious acetate of morphine spoken of in the last number of the *American Journal of Pharmacy*, and which was obtained from the house of Messrs. W. and L. Krumbhaar, of Philadelphia.

Your committee examined the article and readily came to the conclusion that it was a sophistication. In order, however, to ascertain the constituents of the article, a portion of it was submitted to William H. Ellet, M. D., Professor of Chemistry in Columbia College, whose statement of the analysis is subjoined.

Messrs. Rushton and Aspinwall had previously submitted a portion, for analysis, to Messrs. J. Leowolf & Co., manufacturing chemists of this city, whose account we have obtained, and submit with that of Dr. Ellit. The conclusion in both is the same, viz.: that the powder purporting to be acetate of morphine, is entirely spurious, consisting of sulphate of lime, and a little free sulphuric acid, but resembling in its colour the genuine acetate of morphine.

Your committee, bearing in mind how essential the purity of preparations such as those of morphine are, to the suffering and the dying, cannot attribute the present case to a cupidity so atrocious; but are rather led to the conclusion that it must have arisen from error or accident occurring at the laboratory of the manufacturer.

Your committee also submit a specimen of a powder, ground by order of, and sold by a large drug-house in this city, as powdered colocynth. The taste of aloes is very distinct in this powder, and it probably consists of aloes, with

some other more inert powder, perhaps liquorice or gentian. No appearance of colocynth is discoverable.

All which is respectfully submitted.

OLIVER HULL,
C. ADAMSON,
JAMES H. HART,
} *Committee of Inspection.*

Analysis by W. H. Ellet, M. D. I have examined a substance labelled "Acetate of Morphine," furnished me for that purpose. It was in the form of a powder of unequal fineness, but with no appearance of crystalline structure. It had a slighlty yellowish colour, an acid taste, and an odour resembling that of sulphuric acid, which has been contaminated with small quantities of vegetable matter. It was very slightly soluble in water, which liquid however, even in small quantities deprived it of its taste, and became itself acidulous. The acid matter contained in the solution was found on examination to be free sulphuric acid. The undissolved portion proved to be sulphate of lime. No indications were obtained, from experiments made for the purpose, of the presence of morphia, or any other of the vegeto-alkalies.

As nearly as I was enabled to determine from the small quantity of the article furnished me, it consists of sulphate of lime, mixed with from seven to eight per cent. of impure sulphuric acid.

(*Signed,*) WM. H. ELLET.

Analysis by J. J. Tobin M. D. and S. Rosengarten. Having been requested by Messrs. Rushton and Aspinwall to analyze a powder which they had received as acetate of morphine, we herewith inform you of the result of our chemical investigation, and the method we employed in order to determine with accuracy the composition of the said powder, in as far as it was in our power so to do, in the short space of time which those gentlemen could allow us, and our other occupations would permit.

The appearance of the powder was similar in colour to that of good acetate of morphine, but it consisted of shapeless and unequal masses which induced us to suppose at first sight, that it had not been properly evaporated to dryness, and that the acetic acid prevailed over the base.

Five grains of the powder were treated with 200 grains of distilled water which only dissolved 0.4 of a grain. The action of hot water was perfectly similar. On adding acetic acid in considerable quantities, in order to see whether there was any prevalence of a base, which is often the case after long exposure to the air, or when carelessly prepared, we found to our great astonishment that only a very trifling portion (0.1 grain) of the powder was farther dissolved; thus proving to us that very little, if any morphine or narcotine are contained in the said acetate of morphine, both of these substances being perfectly soluble in acetic acid: our attention was therefore now directed to the insoluble residuum which we presumed, and found to be composed of substances perfectly foreign to acetate of morphine; but wishing if possible to determine what the soluble half grain consisted of, we precipitated it with ammonia, and having washed and dried the precipitate which had neither increased nor lost in weight, we poured over it a solution of caustic potash which produced no effect; thus convincing us that no particle of morphine is contained in the powder which we have received for analysis. To discover whether the powder was composed of organic or inorganic ingredients we treated a part of it with strong nitric acid, which only produced a scarcely visible yellow colour upon the edges of the powder; whereas had organic substances been present, the powder would have been coloured or destroyed: morphine thus treated becoming deep red, strychnine and other similar organic bodies yellow or red. Another portion was submitted to the action of fire upon a thin piece of glass, and though the latter was heated to melting, the powder remained apparently unchanged. The examination of the insoluble 4.5 grains offered the following phenomenon:

A portion of the powder dissolved in diluted nitric acid

(in which it only completely dissolved at a boiling heat) and treated with oxalate of potash gave a considerable white precipitate of lime in combination with oxalic acid.

Another portion of the same solution heated with sulphuric acid afforded a white pulverulent precipitate interspersed with fine needle-shaped crystals perfectly similar to those of sulphate of lime. In order to determine with what acid this base was combined we treated a part of our solution in nitric acid with nitrate of barytes and obtained a strong precipitate of insoluble sulphate of barytes. To be quite sure that the powder given us for examination consists as the above analysis already sufficiently proves, only of sulphate of lime with a trifling quantity of organic matter, we again treated a portion of it with distilled water, and upon adding a solution of nitrate of barytes we obtained a precipitate of sulphate of barytes, and with a solution of oxalate of potash, an oxalate of lime.

Selected Articles.

ART. XXIX.--OBSERVATIONS ON THE PREPARATIONS OF OPIUM. By L. R. Le Canu.

Following the example of some pharmaceutists, who, unfortunately have not had as many imitators as they merit, M. Soubeiran has lately made many highly interesting observations on several pharmaceutical preparations, and especially on those of aconite, sarsaparilla and rhatany. It must, however, be confessed, that the results which have been deduced from the analysis of these therapeutic agents, have often been disputed; thus M. Caventou is of opinion that the experiments of Hancock, and some other foreign chemists, do not prove, in so incontestable a manner, the volatility, or at least the rapid alterability of the active principle of sarsaparilla by heat, as to render it necessary to abandon the use of his syrup, prepared by a long decoction; on the other hand, M. Polydore Boullay has judiciously observed, that if the analyses of Bucholz and Braconnot show that the extract of aconite, prepared in the usual manner, cannot be depended upon, the more recent researches of Geiger and Hesse, demonstrate that it is an energetic remedy, since, besides the fugitive principle of Bucholz and Braconnot, aconite contains a fixed active principle, viz. aconitine. But, whatever importance may be awarded to these objections, the researches to which they apply are of incontestable utility.

And although in the actual state of organic chemistry, it is dangerous to rely fully on the data furnished by it, and to reject, as imperfect, certain formulæ which subsequent dis-

coveries may prove to be correct, and to propose new modes of operating; I am of opinion that every investigation that tends to make a wise application of the data furnished by analysis to formulæ almost always founded on empiricism, must necessarily advance the art of pharmacy. With this view, I undertook a theoretical examination of the preparations of opium.

I will show, in the first instance, how greatly the opinions of chemists on its chemical composition have varied at different epochs; and the influence these changes of sentiment has exercised on the mode of administration of this remedy.

It was long supposed that the action of opium on the animal economy depended entirely on the presence of volatile principles. Hence the general use of a distilled water of opium, of tincture of opium, of an extract of opium prepared by maceration with a small quantity of water, and concentrated in a water bath.

Afterwards, new observations having led to the opinion that it was possible to render opium purely sedative in its operation, the existence of several active principles was admitted; some of a volatile nature and narcotic, and others of a fixed character and sedative.

Hence arose the torrefaction of opium, its mixture with aromatics to disengage, or at least to neutralize its narcotic powers; hence also the preparation of extract of opium by decoction and prolonged digestion, according to the methods of Hombert, Diest and Baumé; by fermentation according to the plan of Deyeux; by fermentation in quince juice, as recommended by Langelot. All these modes of preparation were evidently principally intended to separate or alter the volatile narcotic principles, and to preserve in the extract such only as were fixed and sedative.

At a still later period, about 1804, when Derosne and Seguin had demonstrated the existence of a peculiar crystalline substance in opium susceptible of acting on the animal economy in a marked manner, without its having been shown by experiments that the crystalline substance of Derosne differed in an essential manner from that of Seguin; the crystalline

substance was considered as the active principle of opium, and it was supposed that those remedies of which opium was the basis, were possessed of remedial powers in proportion to the quantity of the crystalline substance contained in them: hence the great object became to preserve this in the extracts and even to render them more active, by separating all the resinous matter which accompanied the active principle.

The method of the Batavian pharmacopœia, which consisted in treating the opium with twice its weight of cold alcohol, drying the residuum, dissolving it in water, and evaporating this solution; that of M. Limousin Lamothe, an excellent modification of the plan of Josse, and which ordered the opium to be beaten up with a certain quantity of rosin, boiled in water, and malixated, to separate the solution of opium from the resinous mass, were both intended to separate the resin of the opium, either by dissolving it in alcohol, or by combining it with the rosin.

Finally, some years afterwards (1817) M. Robiquet, in endeavouring to perfect the method of Sertuerner, having proved, in contradiction to the opinion of the learned German pharmaceutist, that if the crystalline substance of Seguin is a true organic salafiible base, existing in opium intimately united with meconic acid; the crystalline substance of Derosne is not a submeconate, but a distinct substance preëxisting with the acid meconate; and, on the other hand, M. M. Orfila and Majendie, having demonstrated, that each of these two substances, the salt of Derosne (narcotine,) and the salt of Seguin (morphine,) had different physiological properties; it was perceived that it would be highly advantageous to be enabled to obtain opium deprived of one of these principles. The methods of Robiquet and Dublanc, founded on the property possessed by either of taking up the the narcotine from opium without attacking the acid meconate of morphine, were consequently proposed.

Thus the volatile principles of opium, which were at first esteemed as the only medicinal portions of opium, afterwards only shared the esteem of physicians and pharmaceutists, and

finally, were totally discarded in favour of narcotine and morphine.

Since 1817, the opinions entertained of the composition of opium, and of the therapeutic influence exercised by each of its constituent principles, remained much the same. Thus, in a thesis maintained before the School of Pharmacy, by M. Decoudemanche, in 1821, he states that the relative value of the different preparations of opium may be estimated by the proportion of morphine and narcotine contained in them. Very lately, however, the well proved existence of volatile principles in opium, and more especially the discovery of codeine by M. Robiquet, of narceine by M. Pelletier, and of meconine by M. M. Dublanc, jr. and Couerbe, do not permit us to consider narcotine and the acid meconate of morphine as the only active principles in opium. It therefore becomes necessary to revise the statements of M. Decoudemanche, so as to make them harmonize with the actual state of science. I shall, therefore, after having established the chemical composition of opium on the most recent and positive data, indicate the most common preparations of this article, and endeavour to determine *a priori*, from their known properties, which of the constituent principles of opium should be found in each of these preparations, and which are to be modified or eliminated.

The constituent principles of opium now generally recognized, are:

1. Narcotine of Derosne and Robiquet.
2. Acid meconate of morphine of Seguin and Sertuerner.
3. Acid meconate of codeine of Robiquet.
4. Narceine of Pelletier.
5. Meconine of Dublanc, jr. and Couerbe.
6. Caoutchouc of Robiquet.
7. Bassorine of Pelletier.
8. Sulphate of morphine of Dupuy.
9. Sulphate of lime } of Derosne.
10. Sulphate of potash }
11. Volatile matters, }
12. Resinous do. } of the older chemists.
13. Gummy do. }

14. Fatty matter having acid properties of Pelletier.
15. Ligneous fibre.

The most generally used of the preparations of opium, are: The powder; the alcoholic tincture; the liquid laudanum of Sydenham; the liquid laudanum of Rousseau; the distilled water; the extracts; and finally, the syrup.

The Powder. It is evident that this preparation must contain all the principles of opium in their natural state: it is true the volatile principle will be in the greatest proportion, when the powder is recently prepared, is kept in a well closed vessel, and is made from opium dried at a very low temperature. These conditions should always be borne in mind, when the powder is prepared, as this powder should represent opium itself.

Alcoholic Tincture. The alcoholic tincture of the codex prepared with the aqueous extract to be hereafter spoken of, should contain all the constituent principles of this extract which are soluble in alcohol at 22°. I say all, for a well prepared extract dissolves without residue in alcohol of the above strength. The results will not always be identical, if the alcohol employed, as is ordered by certain foreign pharmacopœias, is of different degrees of strength. In such case, some principles soluble in alcohol at 22°, might not be taken up, at least in part. This would be the case, principally with the gummy matter, and the sulphates of lime and potash, which would be left undissolved if the alcohol were very much concentrated, on the contrary the resinous, the acid fatty and the volatile matters, and even the narcotine will not be taken up if the vehicle be very weak.

Alcohol not appearing to exercise any reaction on the principles of opium, and the extract of this drug, being completely soluble in alcohol at 22°; it is evident that the preparation under consideration must consist of a simple aqueo–alcoholic solution of all the principles contained in this same extract.

Laudanum of Sydenham. In the preparation of the laudanum of Sydenham, a product of the maceration of opium, cloves, cinnamon and saffron in Malaga wine, this fluid dissolves allthe principles that are soluble in weak alcohol; and

consequently, the acid meconates of morphine and iodine, meconine, narceine, the sulphates of morphine and potash; but does not take up all the resinous, volatile or fatty matters: the greatest portion of the narcotine also remains undissolved.

It is highly probable, that the bassorine and caoutchouc are wholly insoluble in both the alcohol and water, though it is not absolutely certain, as an analysis of neither the solution nor the residuum has been made, but Malaga wine does not result from a simple mixture of alcohol and water. In the usual proportions of this wine of eighteen volumes of alcohol to sixty-two of water, the principles of the wine may react on those of the opium. For example, the free acids might facilitate the solution of the narcotine, which, it is well known is much more soluble in acid liquids than in those which are not so, and thus modify the physiological effects, according to the observations of M. M. Magendie and Orfila. On the other hand, the tanning matter may combine with the narcotine and codeine, as has been shown by M. M. Derosne and Robiquet, and thus neutralize them to a certain degree.

It results from the above, that any attempt to establish *a priori* the composition of the laudanum of Sydenham, must fail, though it appears evident that this remedy cannot be considered as a simple solution of opium in wine. The chemical composition of wines, is so different and ever varying in the same species, that it becomes necessary to use the wine ordered by Sydenham, to obtain a remedy as nearly as possible similar to that so highly praised by him. Added to which, the nature of Malaga wine, is not favourable to the solution of the narcotine, acts but slightly on the codeine, and above all the tinctures made with it are not apt to change, as it contains less free acid and tannin, and more alcohol and sugar than most of the French wines.

Laudanum of Rousseau. The laudanum of Rousseau, appears to constitute a remedy less uniform in its composition than the last mentioned, as fermentation is an operation so little understood, that we cannot neither produce it nor arrest nor direct it when produced. Its composition must vary not only when instead of preparing it according to the original

formula of Rousseau, by adding to the liquid evaporated to the consistence of a syrup, the alcoholic fluid collected during the evaporation; it is prepared according to the amended formula of Baumé, by adding to the syrupy liquid a quantity of alcohol, equivalent to that supposed to be lost during the evaporation; but also, on account of the products which are formed during the fermentation. Hence, it would be impossible to judge of its composition *a priori*. This, in my opinion, is one of those remedies that must be scrupulously prepared according to the original formula, waiting till further researches shall reveal to us the rationale of the process and its results; but at the same time it ought not to be discarded, because on the one hand, its action has been too often verified to permit us to doubt its efficacy, and on the other, our ignorance of its true composition does not permit us to use a substitute for it.

Distilled water. Water distilled over opium, contains, according to the experiments of M. Pelletier, organic matters; consequently, whatever may be the nature of these matters, which are as yet but imperfectly understood, and without prejudging the debatable question of their therapeutic importance, it may be admitted that the vehicle may give them a certain action on the animal economy, and that a perfect identity cannot exist between preparations in which no attention is paid to these volatile matters.

At the same time, I would remark, that if some physicians have been in error in attributing therapeutic properties to certain bodies, which they do not possess, pharmaceutists on the other hand, have equally erred in not paying proper attention to the principles of organic bodies, and in doubting the properties attributed to various substances, because their means of analysis have not enabled them to explain their effects physically or materially. Of late years, for example, it was denied that a certain colourless fluid, of a slightly empyreumatic odour, has the property attributed to it, of arresting hæmorrhages, because reagents have no effect upon it, and because by evaporation and other means of analysis, nothing is found except traces of an empyreumatic substance,

whilst at the present day we are fully satisfied that the fluid in question may owe its physiological properties to the presence of a small quantity of creosote.

Extracts.—The formula of the older pharmaceutists, already alluded to, those of Hombert, Diest, Baumé, Josse, Limousin Lamothe, Cartheuser, Croharé, and finally, that of Cornet, which is now adopted, and consists of several times macerating for thirty-six to forty-eight hours, opium of commerce, in six times its weight of cold water, filtering, evaporating, redissolving the product when reduced to the state of a soft extract in eight parts of cold water; again filtering and evaporating three different times, appear to me to furnish aqueous extracts, containing the various articles found in that analized by M. Pelletier, namely, acid meconate of morphine, meconine, narceine, gum, narcotine, resin, oily matter, brown acid colouring matter.

I would add: volatile virous principle, acid meconate of codeine, discovered since the analysis of M. Pelletier, sulphate of morphine, sulphate of potash, and sulphate of lime.

The residue is therefore composed of: a little brown acid extractive matter, which is never wholly taken up by the water, a little gum, a large proportion of the virous principle, of the narcotine, fatty matter, resinous matter and sulphate of lime, all the caoutchouc, bassorine and vegetable fibre.

But it should be remarked, that in these different extracts, the soluble principles must not be expected to be always found in equal proportions. For example, the narcotine, resin and fatty matter appear to be more abundant in extracts made by means of hot water, than in those in which cold water has been used; in extracts made by treating the opium by small quantities of water at a time, than in those made with a large proportion of water; in extracts made by simple evaporation than in those by successive solutions and evaporations. The cause of this is, first, that the presence of a large proportion of the soluble principles of opium favours the solution of principles which, in themselves, are but slightly, or not at all soluble; second, that this solubility is also

augmented by the application of heat, which induces a kind of combination between the principles; third, that by redissolving the extract of opium in a large quantity of cold water, and afterwards concentrating the solution, at each successive repetition of the process, a certain quantity of fatty matter, resin and narcotine is eliminated. On the other hand, the volatile principle must be in a less quantity in extracts made by long digestion, than in those made in the usual manner in a water bath, either from its being driven off, or from its having suffered an alteration.

The chemical composition of these extracts, therefore, although very analogous, is not precisely identical.

The extracts prepared according to the Batavian Pharmacopœia, or to the formulas of Lemery and Quincy, also appear to me, must contain all the principles found by analysis in the watery extract of opium, and in the same state, since there is probably no reaction between the alcohol and these principles. The process of the Batavian Pharmacopœia, which orders the opium to be washed with alcohol, to dissolve the resin, before it is treated with water, must necessarily also dissolve a certain portion of its active principles; whilst in the extract of Lemery, prepared by treating opium with alcohol and water successively, the caoutchouc, bassorine, earthy matters and vegetable impurities only are separated. The first of these processes may in reality furnish a more active extract than that made with water alone, if it be true that cold alcohol takes from the opium a proportionally larger quantity of fatty and resinous matter than of the active principles. The second must afford, as regards its bulk, an extract less rich in acid meconates of morphine and codeine, meconine and narceine, as it contains all the resin and fatty matter. At the same time, the greater proportion of narcotine in this extract may, in some degree, compensate for this diminution of the other principles.

The extract by wine, proposed in the codex of 1758, appears to have much analogy to that of Lemery; but the addition of the constituent principles of the wine, principles that must be considered not only as regards the reaction they

may exercise, but also as to the foreign matters they add to the extractive mass, do not permit us to establish that analogy between these two extracts that might have been supposed to exist. What we have said of the laudanum of Sydenham may be applicable to this extract, as the wine contains alcohol, and acid and tanning matters in variable proportions. But, as the codex has not prescribed the quantity of wine that is to be used, the extract may be different, all other circumstances being the same, if different proportions of wine be employed.

The extract by ether, according to the methods of M. M. Robiquet and Dublanc, jr., differ in a striking manner from the preceding; for not only the ether employed separates the narcotine and fatty matter, of which the watery extracts always retain a portion, but also takes up the meconine which is also soluble in ether, which is not the case with the meconates of morphine and codeine or narceine.

This extract, therefore, is widely different in its composition, and doubtless also in its physiological properties, from the other extracts.

To conclude, the preparations of opium spoken of cannot be considered as identical in their composition, either, because the constituent principles of opium exist in them in different proportions, or in different states. Hence their action on the system cannot be the same.

But as the physiological effect which physicians wish to produce by their administration, are extremely various, there may be a real advantage in using one or other of them in certain cases, or *vice versa*. Thus, when the physiological effect is intended to be produced, it is better accomplished by the acid meconates of codeine and morphine, than by narcotine, or even unfavourably modified by the presence of this latter substance; the extract of M. M. Robiquet and Dublanc being free from it, will be found preferable to the common watery extracts; and in like circumstances the laudanum of Rousseau, prepared according to the original formula, will be better suited to the case than that prepared according to the reformed formula of Baumé. Each of the above men-

tioned preparations may then offer special advantages, but it by no means follows that they are of equal value.

In the first place, it must be conceded that such of the preparations of opium, which, like the extracts and laudanum made by fermentation, are prepared by manipulations which do not always afford identical products, have a marked disadvantage. In the next place, there are others which appear to present so much analogy of composition, on account of the methods by which they are prepared, that it is rational to suppose that they may be used for the same purposes. To this class belong most of the watery extracts.

It is therefore necessary to fix the best method of forming the first, and to determine of chemical and physiological experiments, if among the latter, that which is the most readily made, possesses any advantage over, or is equal to the others. Researches of this kind, in my opinion, will be of greater advantage to the pharmaceutic art, than the introduction of new preparations of the article under consideration, which in a few years are perhaps destined to become as problematical as their predecessors. I am confident that nothing is more prejudicial to our art than the great increase of new preparations, which do not produce either immediate principles possessed of unvarying properties, or combinations faithfully representing the primary article.

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ART. XXX.—ON THE MANIOC, AND ANALYTICAL EXPERIMENTS ON THE JUICE OF ITS ROOT. By O. Henry.

The Manioc (*Jatropha manihot, Janipha manihot,*) of the family of the Euphorbiaceæ, is a plant indigenous to America, and the cultivation of which is much attended to from Florida to the Straights of Magellan, as well as in many parts of Asia and Africa. In fact, this plant furnishes one of the principal sources of food to the inhabitants of these countries. There are two kinds of manioc, the *bitter* and the *sweet*, both of which are cultivated and afford different products; the bitter manioc, notwithstanding the active poisonous principle it contains, is the most esteemed, and yields the largest product; it is well known that this dangerous principle is dissipated or destroyed by the action of heat, and it is then easy to extract from the root a substance that is extremely nutritive both to man and animals. All authors agree in their accounts of the methods employed to extract this alimentary product, hence I shall not dwell on this point, but will merely present some details which I trust may prove interesting, as they were obtained from actual observation. I am indebted for them to Dr. Sureau, who, having lived for ten or twelve years in St. Domingo, has had numerous opportunities of inspecting every part of the process.

The *Janipha manihot* presents, as I have before said, two very distinct varieties, one *sweet*, and not poisonous; the other *bitter*, containing, besides the alimentary principle, a violent and subtle poison; this latter kind is the most generally cultivated.

It is difficult to distinguish the roots of these two varieties from each other; but on closely inspecting them, it will be perceived that in those of the sweet manioc, there are ligneous fibres towards the centre, which are not found in the bitter; and moreover, the first becomes soft by boiling, whilst the other does not. From these roots are prepared, *cassava*, *tapioca* and *flour of couscous*.

To obtain cassava, roots of the size of the arm are washed

and reduced to a pulp with a coarse rasp or grate, and this pulp subjected to pressure in bags of different kinds, but that generally used is formed of the bark of a tree, and the pressure made by suspending weights to its bottom; the liquid which is forced out is received in proper vessels.

The *cassava* is prepared by taking the pulp thus freed from the juice, and spreading it about two inches thick on iron plates, over a fire, after which the cakes thus formed are dried in the sun.

The root of the manioc furnishes a great quantity of fecula, which is prepared in the usual way, and sold under the names *starch*, *cipipa*, or *moussache*. Washerwomen make use of it, but prefer *arrow root*, which they erroneously term *sago*. It is important in the practice of medicine to ascertain the origin of the feculas sold in the shops, for serious consequences have resulted from the administration of that of the manioc.

Those parts of the pulp which remain on the sieve, are dried, slightly roasted and contused, so as to form a very coarse powder, termed *flour of couscous or tapioca*, when boiled with milk it forms an excellent article of food.

The root of the bitter manioc, as has already been stated, is very poisonous, and it is evident from the above, that its poisonous principle resides in the juice; this principle appears to be very volatile, and its penetrating odour resembles that of hydrocyanic acid. Nevertheless, although the juice of the bitter manioc is extremely dangerous the negroes often apply thick layers of the recent pulp on large ulcers, without experiencing any other effects than a marked melioration of the disease. It is probable then, that if hydrocyanic acid forms part of the poisonous principle, in such proportions as are indicated by the smell of the juice and the volatility of the poison, this pulp could not be applied with impunity on surfaces of so great an extent, even making all due allowances for the diminished vitality of the parts, for it is only to old fungous and callous ulcers that it is applied.

Dr. Sureau has also transmitted to me, a case exemplifying the poisonous action of this juice, which possesses no slight interest.

It is known that the slaves in the West Indies often attempt to commit suicide. The following says Dr. Sureau, was communicated to me by a magistrate of Cavaillon, St. Domingo, the son of a physician, and a well informed man.

"Before the revolution, said he, I was one of the inspector generals of culture; taking my rounds one day, I arrived at a house where they informed me that one of the negroes had just taken a quantity of the juice of the bitter manioc. He was surrounded by the other work people, and we much feared that his example as is almost always the case, would be followed by his companions. I immediately ordered him (already beginning to feel the effects of the poison,) to be whipped. He was therefore turned over to the inexorable overseer, who pursued him round the court yard, armed with his treble whip. The dragoons of my escort also pursued him, and the poor wretch to escape the blows, ran about, rolled himself on the ground &c. The punishment being over, it was fully expected that he would soon fall a victim to the poison he had taken, when to our joy, he experienced no ill effects from it. About a month afterwards another negro in the same neighbourhood, poisoned himself in the same way; one of the dragoons, who was present at the *cure* of the above, immediately advised the remedy then prescribed; the patient was severely scourged, and recovered."

Hogs are very fond of manioc, and when cassava is making they often deceive the vigilance of their keepers, and swallow large quantities of the juice. When this is the case, they are pursued for an hour, so as to fatigue them greatly, which generally prevents the poison from taking effect.

It would be easy, says Dr. Sureau, to give a satisfactory explanation of these facts. In general, absorption takes place in an inverse ratio to the degree of force and vital energy. Thus individuals who are enfeebled from moral or physical causes, readily contract contagious disorders. Those, on the contrary, who lead an active life, and are endowed with much moral energy, or a certain degree of recklessness, are less exposed than others to contagious miasmata.

There can be no doubt, that in the case in question, the

fatigue, the whipping, and the exertion made by the patients, by accelerating the circulation, produced an abundant perspiration, and prevented the absorption of the poisonous principle.

The facts just related leave no doubt as to the poisonous character of the root of the bitter manioc. Its active principle resides in the juice extracted by expression, and appears to be very soluble and volatile or destructible by the action of the heat used in preparing the pulp for food. It, therefore, is of importance to ascertain the nature of this principle. M. M. Souberan and Pelletier have already examined a small quantity of the juice; but on account, in all probability of the minute portion on which they operated, the juice on distillation only afforded them a smell of bitter almonds, without any other indication of the presence of hydrocyanic acid, a small quantity of uncrystallizable sugar, and an azotized substance. Having received a bottle of the juice of the bitter manioc from Dr. Sureau, sent with the greatest care, and accompanied with some of the distilled water of the same plant, I subjected these products to various trials, hoping that the juice, although very alterable, might still present some interesting peculiarities, and a portion of the active principle. The distilled water, giving no indication of hydrocyanic acid, nor any thing thing that was remarkable, I pass at once to the analysis of the juice.

Analysis of the Juice. This fluid, obtained from the fresh pulp by expression, was of a greenish yellow colour, not very consistent, translucid, especially after filtration, which separated some amylaceous particles mixed with glutine. Its taste was somewhat bitter, and at the same time sapid and not disagreeable. When evaporated in the open air, it afforded small but very distinct crystalline grains.

Reagents demonstrated the presence of very little lime, but of a tolerably strong acid, alcohol produced viscous white flakes and barytes and nitrate of silver threw down precipitates.

On exposing the juice to the action of heat, a sensible odour of hydrocyanic acid was disengaged, which was followed by

a very pungent smell of another kind. To verify the nature of these volatile principles, I collected the vapours with the greatest care in a diluted solution of nitrate of silver; white flakes were formed, which when collected on a watch glass, washed with alcohol and water, gave out on the addition of hydrochloric acid, an unequivocal smell of cyanogen. There exists then, in the juice of the manioc, either hydrocyanic acid, or a principle capable of giving birth to it. After this trial, the fumes continuing very pungent but not acting on the salt of silver, I received them in pure water, which soon acquired a marked acidity.

Wishing to ascertain the nature of this acid, and to prove whether it was not constituted of formic acid, originating either from the hydrocyanic acid or from a peculiar cyanic radical preëxisting in the juice, I evaporated to dryness the acid liquid, previously neutralized with caustic soda; the salt which resulted, heated in a small tube with deutoxide of mercury, did not present the marked character of the formiates; namely, the formation of metallic mercury and carbonic acid: But when treated with sulphuric acid this salt produced pungent fumes of acetic acid. It is therefore this acid that exists in the juice examined; it may perhaps have resulted from the alteration of saccharine principles during the time the juice remained in the bottle.

The substance remaining in the retort after the above operation, had acquired a brown colour, it was not exempt from acid properties, and its bitter taste indicated the presence of an osmazomic principle. I evaporated it very cautiously over a water bath, to the consistence of a syrup; during this evaporation an odour of acetic acid was very perceptible. The syrup when cold became solid, the mass was placed on a cloth, drained, pressed and washed with alcohol: the result was a whitish deposit AA.

The drainings and washings again concentrated, were bitter, very acrid and irritated the throat very powerfully; their osmazomic odour was more marked. Finally, on the addition of a little yeast, a slight fermentation was produced, after the acid had been completely neutralized. Hence, it

appeared to be a mixture principally formed: 1st, of an acrid, bitter principle; 2d, of acetic acid; 3d, of vegetable osmazome: (or what I have termed such,) 4th, of a trace of sugar.

The whitish deposit AA, after the washing with alcohol, was dried at 100° C., when it became pulverulent; it was then dissolved in tepid, distilled water and filtered, (there was a very small residuum of insoluble phosphate of lime;) the solution was limpid, without any sensible colour or taste; when treated with reagents it gave no indication of free acid; the oxalate of ammonia formed a slight white precipitate in a short time. Caustic soda afforded a gelatinous white precipitate. Ammonia a flocculent one. Phosphate of soda produced a turbidness, which became more evident on the addition of ammonia. The acetate of lead, and nitrate of silver produced only a slight turbidness. Corrosive sublimate, proto-nitrate of mercury, and the red oxide of the same metal gave no indications of the presence of a formiate. Alcohol caused a tolerably large precipitate. Muriate of barytes gave a sensible deposit.

The solution evaporated by a gentle heat, afforded a neutral, brilliant, white crystalline salt, slightly efflorescent when exposed to the air. This salt, when calcined in a platina crucible, was decomposed, giving out an odour of burnt bread: after a long calcination there was a white residue which was found to be magnesia; it formed about thirty-eight to forty per cent. of the salt calcined.

Finally, a portion of the organic salt having afforded a white precipitate with muriate of barytes, I washed this carefully, and by means of diluted sulphuric acid, obtained some small needle like crystals, which were soluble in alcohol. I am of opinion that this salt, contained a peculiar organic acid, but the quantity was too small to determine the fact with certainty; I have termed it *manihotic acid.*

From the above experiments, it appears that the juice of the bitter manioc examined by me, was composed of:

1st. Hydrocyanic acid, or at least of a volatile principle capable of giving birth to it.

2d. Of acetic acid, produced, in all probability, by the presence of a certain proportion of sugar in the juice.

3d. Of an organic salt, having a base of magnesia, the acid united with it appearing of a peculiar character, (manihotic acid.)

4th. Of an acrid, bitter principle, irritating the throat, and very soluble in water and alcohol.

5th. Of a brown compound substance, soluble in the same fluids, having an osmazomic smell and taste, and mixed with traces of sugar.

6th. Of some salts, especially phosphate of lime.

7th. Of amylaceous fecula and glutine, forming an insoluble deposit in the unfiltered juice.

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ART. XXXI.—NEW METHOD OF OBTAINING CANTHARIDINE.

By M. Thierry.

M. Robiquet was the first chemist that isolated the vesicating principle of cantharides, or at least that which enjoys this property in the most marked manner. He gave it the name of *cantharidine*, and pointed out its distinguishing characters: but his mode of extraction is long, complicated, and gives but a trifling product. For a long time past I have endeavoured to extract cantharidine by a more simple and expeditious procedure, when at last I hit upon it by accident.

About ten years since I prepared vesicating plaster, which, not acting as expeditiously as I wished, to render it more active I moistened its surface with an etherial tincture of cantharides which had been made for some time. Some hours afterwards on examining the plaster, I was surprised to find its surface covered with crystalline scales.

Having to prepare cantharidine by the method of M. Robiquet, and having obtained a very small quantity, I reflected on what other means might be employed, and recollected the above occurrence, which I determined to take advantage of.

Cantharidine may be produced by three methods which are very analogous, differing only in the price of the menstruums used. These are alcohol, etherial alcohol at 40° and alcohol at 34°.

Whatever may be the vehicle employed, the product is identical in quality and quantity. When cantharides are treated with ether, but little green oil is obtained, and it is easy to separate the cantharidine from this oil. With etherial alcohol, there is more green oil, and finally, with alcohol the proportion is still greater. The difficult part of this process is to separate the cantharidine from the green oil.

The etherial tincture of cantharides is of a slight greenish yellow, although the green oil is very soluble in ether. The etherial alcoholic tincture is much higher coloured, and that prepared with alcohol is almost black.

To obtain cantharidine the cantharides are to be macerated in one of these menstruums for some days, and the mixture then placed in an apparatus for filtering by displacement. When the solution has drained off, another portion is to be added till it passes almost colourless. The quantity retained by the powder is obtained by chasing it off by means of water. The tinctures are to be mixed together, and distilled, to obtain the ether or alcohol employed.

This being done, the retort is suffered to cool, when the cantharidine will crystallize in scales, if the solution is concentrated; and in beautiful four-sided prisms, if it is weak.

This cantharidine, not being perfectly white, it is again to be subjected to the action of boiling alcohol, with the addition of animal charcoal. Instead of subjecting the filter made use of, to pressure, if cold alcohol be poured on it, this will dissolve all the green oil which contaminates the cantharidine.

Pure cantharidine has no smell. When heated in a glass tube, it melts at 210° C. and is sublimated in white fumes which condense at the upper part of the tube, in brilliant, acicular crystals. A black matter remains at the bottom of the tube which is insoluble in water, alcohol or ether.

Concentrated sulphuric acid does not dissolve cantharidine,

except when aided by heat; the solution in the latter case is of the colour of dark brandy; on the addition of water to this solution, the cantharidine is precipitated in small acicular crystals. Nitric acid, with the assistance of heat, dissolves it without change of colour. The solution, on cooling, deposits crystals of the some form, but of a larger size than those from the sulphuric acid. Hydrochloric acid acts like the nitric.

A solution of caustic potash dissolves cantharidine. If acetic acid be added to this, the cantharidine is precipitated in a crystalline state. A solution of caustic soda acts in the same manner. Liquid ammonia has no action.

Oil of turpentine, when boiling, dissolves cantharidine, and on cooling deposits it in a crystalline state. Almond and olive oils dissolve it with the assistance of heat, but it again separates on cooling. Axunge acts in the same way.

From the analysis of M. M. Pelletier and Henry, cantharidine is composed of

Carbon	68.56
Hydrogen	8.43
Nitrogen	9.89
Oxygen	13.15—100.03.

It may be said, that when cantharides are mixed in olive oil or axunge, these substances become charged with the vesicating principle, and thus form very active ointments! This is true. Cold alcohol dissolves only a very small quantity of pure cantharidine; and yet I prefer it as a vehicle for its extraction; but when cantharides are treated with alcohol, this acts at the same time on the cantharidine and the green oil with which it is combined in the insect.

To prepare an ointment with cantharidine, this must be divided by adding a small quantity of rectified alcohol, mixing this with a little axunge, triturating for a long time, and finally incorporating it with the rest of the grease. One grain of cantharidine to the ounce of axunge forms a very active ointment.

Two kilogrammes of cantharides treated as above describ-

ed, gave eight grammes (two drachms,) of pure cantharidine.

I have treated cantharides which contained no cantharidine. Some that I left in a drying stove for six weeks, gave no trace of this principle. It is probable that the means sometimes used to kill these insects, influence the quantity of cantharidine to be obtained.

It has been said that the green oil has no vesicating property; this is true, but it is only when it is very old and has deposited all the cantharidine it contained. To verify this, I rubbed my arm with some oil recently prepared; twelve hours afterwards the skin was red, and this irritation lasted several days. With some prepared a year before, no such effect was produced. *Journ. de Pharm.*

ART. XXXII.—PREPARATION AND EMPLOYMENT OF ACONITINE.

By Dr. Turnbull.

We have made several attempts to obtain aconitine from the Parisian chemists, for the purpose of employing it in medicine, but have never hitherto succeeded. It is now, however, prepared in town, and may be had in sufficient quantity for present use, by those practitioners who may wish to make trial of its properties. We have contrived several processes for obtaining it, two of which shall now be given: the first is the easier to manipulate, but the second yields a much purer result.

A quantity of the fresh root of the Aconitum Napellus must be procured, and care should be taken that it be sound, and that the root be that of monkshood; for sometimes other roots are sold for it. Let it be carefully and cautiously dried, and then reduced to powder; this latter operation is not unattended by danger, especially if a part of the fine dust which rises

from it be inhaled. One part by weight, of the powder, and two parts, by measure, of strong alcohol, are to be digested together in a gentle heat for seven days, and the tincture, while warm, is to be filtered. It is then to be reduced to the consistence of an extract by careful evaporation, at a low and well regulated temperature; the object of this, is to prevent the destruction or expulsion of the active principle, which would very propably ensue, if the temperature employed were higher than barely sufficient to carry off the alcohol. To the extract thus prepared, liquid ammonia is to be added, drop by drop, and well mixed with it, to precipitate the alcaloid: and in this part of the process, care must be taken that too much be not added, as in some instances the product appears to have been decomposed by inattention to this circumstance. It is difficult to give a precise rule as to the quantity; but enough will have been added, if the extract give out the odour of ammonia, when stirred.

The mass now consists of impure aconitine, mixed up with a quantity of extractive and other matters, soluble in water; and it may be taken up either with boiling alcohol, or sulphuric ether; or the soluble matter may be removed by repeated washings with small quantities of cold water, which will leave the aconitine. This latter process, is the one we have generally employed, and is performed by pouring a little water on the extract, and mixing them carefully together, then allowing the undissolved part to subside, pouring off the fluid, and repeating the operation, as long as any soluble matter is taken up; a quantity of light brown, or grey powder is left, which may be purified by subsequent solution in alcohol. This powder contains the active properties of the aconite, in a high degree of concentration. A grain of it was dissolved in a drachm of alcohol; and twenty drops of the solution put into the mouth of a guinea-pig, occasioned death in a few minutes. Other experiments have been performed; all of which prove the extreme energy of the substance.

The second process consists in dissolving the alcoholic extract, prepared as before, without the addition of the ammo-

nia, in as much cold water as will take it up, and carefully decanting the solution from the insoluble part, and then filtering it. To the filtered solution, liquid ammonia is to be added, drop by drop, as long as it occasions any precipitation. When the precipitate has subsided, the supernatant fluid should be carefully poured away, or drawn off by means of a syphon; and after the precipitate has been deprived of as much of the fluid as possible, it should be purified by a sufficient number of washings with small quantities of cold water, and then carefully dried. The product obtained by this process is white.

The aconitine is possessed of an action similar, in some respects at least to that of Delphinia. When a small quantity of it, either made into an ointment or dissolved in alcohol, is rubbed for a minute or two upon the skin, a sensation of heat and prickling is experienced; to this succeeds a feeling of numbness and constriction on the part, as if a heavy weight was laid upon it, or as if the skin was drawn together, by the powerful and involuntary contraction of the muscles beneath. This effect lasts from two or three to twelve, or more hours, according to the quantity rubbed in. So small a portion as the one-hundredth part of a grain, has produced a sensation that has continued a whole day; but the alcaloid in this instance was in a high degree of purity.

The action of the Aconitine upon the cutaneous vessels, appears to be less than that of either veratria or delphinia; for in no case hitherto observed, has it produced a greater degree of vascular excitement, than might easily be accounted for by the friction itself; and in one instance where the Veratria ointment did occasion irritation, the aconitine has been employed without giving rise to any.

The diseases in which I have chiefly employed the aconitine externally, are tic douloureux and neuralgic affections generally, and in gouty and rheumatic cases; and its success has fully answered the anticipations that had been formed of its utility. I have employed it in the form of solution in alcohol, in the proportion of one or more grains to the drachm, and in ointment made according to the following prescription:—

Aconitæ, gr. ii,
Alcohol, gtt. vi,
tere optime et adde,
Axunge, ʒi,
ut fiat unguent.

The object of adding the alcohol, is to prevent the aconitine from forming a thick compound with part of the lard, which renders it difficult to make a proper ointment.

The proportion of the alcaloid in this prescription will, in general, be sufficient to begin with, but it may be augmented to four or five grains to the drachm, if necessary; and in one case of tic douloureux of unusual severity, I prescribed as much as eight grains to the drachm, with the most marked benefit. The best manner of applying the ointment, is simply to rub a small part of it over the whole seat of the affection, till the pain be either for the time removed, or until the full effect upon the cutaneous nerves above described be brought about; and the friction should be repeated three or four times, or more frequently in the day, according to the effect produced upon the disease. The proportion of the aconitine ought to be increased at every second or third friction; and the same rule elsewhere laid down, in regard to the action of Veratria and Delphinia, also holds good in the present instance, namely, that unless the friction occasion a full developement of the peculiar impressions caused by the aconitine when rubbed on the skin, no benefit whatever is to be looked for from its employment. It is almost needless to remark that an application of such activity should not be resorted to, if there be the slightest abrasion of the surface of the skin, and that it should be carefully kept from coming in contact with any of the mucous membranes.

The next preparation that requires notice, is the ammoniated extract of aconite; this is propably the best appellation for the substance, although it be in reality a mixture of all the active principles, along with the extractive and other matters. It is made by evaporating very carefully, and at a low temperature, the tincture of the dried root of the plant, prepared as already directed in the process for obtaining the aconitine, to

the consistence of an extract. To every drachm of this, eight or ten drops of liquor ammoniæ should be added; and after the mixture has stood a short time in a very gentle heat, to drive off the excess of ammonia, it is to be used in the form of ointment, according to the following prescription:—

℞. extract, aconit. ammon. ʒi. axung. ʒiii. M. ut fiat unguent.

This, from its dark colour, may be a less agreeable application than the aconitine ointment; but it appears to me, to be at least as efficacious, and it has the advantage of being easily and cheaply prepared: and on these accounts, it is better suited for hospital practice. The proportion of the extract may be increased two or three fold according to circumstances.

When this ointment is rubbed upon the skin, it occasions sensations in the part, similar to those which are produced by the aconitine ointment; they are however, rather more pungent in their character; and this probably arises from the extract containing what is called the acrid principle of the plant, as well as the alcaloid itself; and it is absolutely necessary, that with this preparation also, these sensations should be induced, in order to its having a full effect on the disease for which it is applied.

In the report of the preceding case, it might be inferred that the discovery of the properties of the aconitine, when applied externally, was due to Dr. Roots; but in justice to him, I must state that the report was not drawn up by him, and that he has in the most handsome manner disclaimed all merit in the discovery.—*London Medical and Surgical Journal, for February,* 1835, *and N. A. Arch. Med. and Surg. Sci.*

Aconitæ,	gr. ii,
Alcohol,	gtt. vi,

tere optime et adde,

Axunge,	ʒi,

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ART. XXXIII.—ON THE BERRIES OF THE RHUS CORIARIA.

By J. B. Tromsdorff.

This species of Rhus is a shrub, found in poor ground. The leaves and young branches are ground and sold in commerce under the name of *Sumach*; and are much used in the preparation of morocco leather.

The berries are distinguished by an acid and slightly astringent taste. M. Tromsdorff analyzed them many years since and obtained an acid salt, which he erroneously supposed to be acid tartrate of potash; his late experiments on a large quantity of these berries, however, have enabled him to correct his mistake.

The acid of these berries he finds to be the malic, principally combined with lime in the state of a super salt; but they also contain a small quantity of malate of potash. The acid exists in the greatest proportion in the down or coating of the berries.

This fruit may be advantageously employed to obtain a pure malic acid, by the following process. Boiling water is to be poured on the berries deprived of their footstalks, and placed in an earthen pot; after remaining in the fluid for about a quarter of an hour, the whole is to be poured on a linen strainer, a red and very acid liquid passes through; the residue is to be well washed with boiling water, and the washings added to the first solution.

This liquid is to be evaporated in a porcelain capsule by a gentle heat; during this process a slight deposit of extractive matter takes place, when the fluid is to be again strained and the evaporation continued. When this has reached a certain point, a large quantity of crystals of a very acid salt of a whitish gray colour will be formed. The last crystallizations will be of a darker colour, and contain a certain proportion of malate of potash.

Finally, a thick and very acid liquid remains from which no crystals can be obtained, which will be presently spoken of.

To purify the crystals, they are to be pulverized, mixed with animal charcoal, and dissolved in boiling water, this method, however, occasions some loss. In fact, the charcoal is not necessary, all that is requisite being to redissolve the impure salt and to again crystallize it.

Pure malic acid may be made from this salt by dissolving it in water, precipitating the lime by carbonate of potassa, and decomposing the solution by acetate of lead. The precipitate obtained is malate of lead, which when dried is very brilliant and of a dazzling whiteness. If the precipitation is performed on a hot solution, the precipitate assumes on cooling the form of small brilliant scales; these are to be collected on a filter, and after being drained and washed with cold water, they are to be suspended in water and decomposed by a current of sulphuretted hydrogen, the sulphuret separated, and the acid liquid evaporated, when it will afford pure malic acid in needles, forming mammillary groups by their agglomeration; these crystals deliquesce on exposure to the air.

Mr. Tromsdorff next examined the syrupy mother water spoken of above; he diluted it with water and added a hot solution of gelatine; a considerable quantity of a combination of gelatine and tannin separated from the fluid, in the form of an elastic mass; but one portion of the precipitate remaining in suspension in the fluid, this continued turbid even after filtration. It was then agitated with a little white of egg and rapidly boiled, when it became clear and was strained through a woollen cloth. It had now lost all its astringent taste, had no action on the salts of iron, or on a solution of isinglass; but still retained some colour, and had a strong acid. By a slow evaporation and the addition of alcohol, it afforded a large quantity of acid malate of lime in dark crystals, which were purified by redissolving and again crystallizing. *Journ. de Pharm.*

ART. XXXIV.—ON AN ACID FROM SAPONINE. By E. Fremy.

On the 17th of February the author addressed a note to the Royal Academy of Sciences, on *Esculic acid.* When pulverized horse chestnuts are treated with cold alcohol, this menstruum takes up the acrid principle they contain, and on evaporation affords a gelatinous mass, of a light yellow colour, which has the following properties: It is soluble in water and alcohol in all proportions, but its solubility decreases in proportion to the augmentation of the concentration of the alcohol; it is insoluble in ether. The aqueous solution froths on agitation; when treated with nitric acid it is transformed into a yellow resin. It is seen that these properties are the same as those of the saponine obtained from the Egyptian soapwort. It may, therefore, be asserted that horse chestnuts also contain saponine.

If this saponine be treated with hydrochloric acid, a precipitate is not immediately formed, but the fluid soon becomes turbid, and deposits an acid, white substance; if heat be used this precipitation takes place at once. This precipitate is scarcely soluble in cold water, very soluble in alcohol, and crystallizes in small granular forms. The author has given it the name of *Esculic acid.* Besides this acid, the saponine in question contains a very acrid colouring principle which has acid properties. The combination of this substance with potash is insoluble in weak alcohol, whilst the esculate of this alkali is very soluble in that fluid.

Saponine, therefore, is to be treated, either with the aid of heat, or otherwise, with a little potash; then alcohol is to be added, which precipitates the combination of the colouring matter with the potash, in the form of a thick syrup. The supernatant fluid is to be decanted and evaporated, to drive off the alcohol. It is then to be treated with an acid, which precipitates the esculic acid. It is therefore evident, that in the saponine of the horse chestnut, this acid is retained by this yellow colouring matter, which prevents its precipitation. Pure esculic acid is almost insipid, and scarcely soluble in water,

very soluble in alcohol, insoluble in ether; nitric acid transforms it into a yellow resin; its combinations with bases are decomposed by carbonic acid. Its composition is:

H. = 8.352,
C. = 57.260,
O. = 34.388.

Calculating from this, which is the mean of several analyses, we are led to the following formula, C^{13} H^{23} O^{6}. Its capacity for saturation was determined on the salts of lead and silver; its atomic weight is 6.944. The atomic composition of esculic acid is therefore: C^{52} H^{92} O^{24}.

This acid, in combining with bases, does not lose its water. The only soluble esculates are those of potash, soda and ammonia. *Journ. de Chim. Med.*

ART. XXXV.—MEMOIR ON TEA. By F. Pigou.

With observations by A. Chereau.

So much has been written on tea, of which there is so great a consumption in and exportation from China, that we should be cautious in crediting what may be published as new on the subject. Nevertheless, when the powerful interest it excites is considered, and how much uncertainty and how many errors exist respecting it, the necessity for further details becomes evident, if it can be proved that they are derived from an authentic source. Those given in the present paper are derived from a report made by Mr. F. Pigou to the English East India Company, who had commissioned him to procure all the information possible with respect to the culture and preparation of this article. To accomplish this, as access to the places where it is cultivated is prohibited to foreigners, Mr. Pigou employed intelligent agents, among others, Chou-qua, who made eight journies to the district, and remained there from four to six months each time; the information he thus obtained forms the basis of Mr. Pigou's report.

The Chinese all agree that there is but one species of the tea plant, and that all the difference observable in the teas of commerce, are owing to the soil and preparation. This is a well known fact, and was first stated by Lord Macartney and Sir George Staunton, who observed it in their passage through the tea district, in the progress of their embassy from Pekin to Canton. Besides which, Chou-qua states that many cultivators, especially about Ankoi, mix the leaves of several other plants with those of the tea shrub. This may be verified by examining the tea of commerce, by immersing it in warm water and unrolling the leaves, all the leaves which are not dentate are spurious.

The different species of tea are artificial. Thus the *Bohea* may be changed into *Hyson* at will, and it is the same with all the other kinds. But Chou-qua affirms that experience has shown, that much depends on the cultivation and soil; so that the *Bohea* will make good or indifferent *Hyson*, according to the locality; however, in the province of Tokein, which is emphatically the tea district, *Hyson* is manufactured in large quantities.

The Bohea district, which forms part of this province, is very mountainous, though the plants are cultivated both on the elevated grounds and in the vallies.

The author has shown that the true *Souchong* is very rare and commands a high price. That sold to foreigners as Souchong, is only the first quality of Congo, and the Congo of the Canton market, is again the first quality of Bohea.

In a tea plantation, (situate on a hill,) there is perhaps but one shrub which furnishes a sufficiently good product to be termed Souchong. And even in this case, the finest and youngest leaves only are classed as such, whilst the rest furnish Congo and Bohea.

Tea harvest. There should be but three gatherings of the leaves, or at most four, (for Souchong but one.) Any attempt to strip the bush beyond this, militates against the goodness of the crop of the succeeding year. The first, which takes place from the middle of April to the end of May, is termed *Loro-tchune;* the second, from the middle of June

to the middle of July, is called *Curl* or *Geech-chtune;* the third, from the commencement of August to the end of September, is denominated *San-chtune.*

Tea is never gathered during the winter. The plants last for several years; when they become old, they decline and die, but the root furnishes suckers. The ground is never manured, but is worked with great care. Tea is not gathered leaf by leaf, the whole twig being cut off. The gathering is made at all times of the day, as it is immaterial whether the leaves are wet or dry.

Manner of preparing Bohea. When the leaves are gathered, they are placed in large, shallow baskets to dry. These baskets are disposed on frames in the open air, and exposed to the action of the sun, if it be not too violent. This exposure lasts from morning till noon. The leaves now begin to acquire their aromatic smell. They are then heated on a stove,* on which a half catty ($\frac{2}{3}$ lb.) is placed at a time; the leaves are twice stirred rapidly with the hand, for the stove is kept very hot, when they are removed with a short brush. On the removal of the leaves from the stove, they are again placed in large flat baskets, and rubbed between the hands, to roll them up, after which they are subjected to the action of milder heat than at first. They are then put in large baskets, suspended over a charcoal fire, well dried, and afterwards spread on a table where they are sorted, and broken leaves &c. removed.

The Congo, according to Chou-qua is twice subjected to the action of the stove, as well as the Souchong: but Youny-shau, another emissary of Mr. Pegou's, says, that Souchong and Congo are not manufactured in this way, but are only two or three times heated over a charcoal fire. He also says that the Souchong, Congo and Hyson, as well as the beautiful Singlo, are beaten with flat sticks, or bamboos,

* *Tacht*, a cast iron stove. As the action of heat renders the tea milder, by extracting the oil, the stove gradually becomes coated with an oily crust, which it is indispensable should be removed by washing. Whenever the leaves become moist, they are again placed on the stove. This process augments the weight of the tea, at each repetition.

after they have been wilted by exposure to the air or sun, and have acquired sufficient pliancy not to be broken by this operation, which developes the aroma, and deprives them of their acridness.

When Bohea has not been twice stoved, it is considered as badly prepared. In this case the infusion, instead of being green, is yellow. The common tea, used by the lower classes in China, is first subjected to the action of boiling water, which, however, does not prevent its preserving much acrimony, strength and bitterness.

Different kinds of Tea. Peko. This tea is prepared with the leaves of plants of three years of age; but only those are taken which have just expanded, whilst they are still whitish, velvety and covered with a soft down. Shrubs of from five and six years of age may also furnish a certain proportion of Peko, but after this the product becomes Bohea, if the plants grow in the valleys, and Congo if on the hills.

Lint-sessin. This appears to be composed of very young, convoluted leaves with their petioles; the Chinese do not esteem it—it is not stoved. It is only prepared to please the eye; the leaves are gathered too young to have any perfume.

*Leoo-ching.** This tea is prepared like Bohea, or like the green tea, as the demand may be; but it is generally used for the manufacture of Singlo, for which it is best suited.

Ho-ping. So called from the country where it grows, about twelve days journey from Canton. The Ho-ping is prepared like the Bohea, but with less care, on account of its inferior quality. Wood is used instead of charcoal in drying, which adds to the unpleasant odour which this tea derives from the nature of the soil where it grows.

Honan. This tea grows opposite to Canton. It is prepared in April and May for the Canton market, especially for female use; it is not exported. It gives a reddish co-

* Leoo-ching is a district about eight days journey from Canton; it produces annually 1000 peculs of tea; the pecul is 133⅓ lbs.

loured infusion. It is worth three candarines a catty; but the best quality will bring twelve candarines.*

Ankoi. So called from the country which produces it, about twenty-four days journey from Canton. It is prepared much in the same manner as Bohea. When this tea is intended for exportation, it is packed in large baskets, similar to those used for Bohea, and heated over a charcoal fire. There is another kind, *Ankio peko.*

Sing-lo and *Hyson.* These teas are prepared in the following manner: after the leaves have been gathered, they are at once stoved, and rubbed between the hands to roll them; after which they are spread on a table to separate them, as they are apt to adhere. This latter operation is performed by women and girls, who, according to their proficiency, can prepare from one to four catties a day.

These operations are repeated, and the tea packed tightly in boxes, whilst hot, as otherwise it would break and crumble.

Sing-lo is more powdery than Hyson, and must be fanned twice, whilst a single process of this kind is sufficient for the latter. The *Tunkei*-singlo is the best, arising from the soil which produces it. It grows in the Hyson districts.

Hyson skin is thus called from its resemblance to the skin or pellicle of the Hyson, and is not as much esteemed as that tea. Hyson skin consists of larger but less handsome leaves, of a poor colour, and is known in London by the name of *Bloom tea.* The *gomi* and the *oot sein* are also varieties of Hyson. The leaves of the first are small and twisted, resembling pieces of twisted wire; the oot sein has a shot like form.

Bing tea, has received its name from the person who first prepared it. It grows about a four days' journey from the Hyson district. The leaves of this tea are long and thin, those of Singlo are short and thick.

* Chinese accounts are kept in tales, maces, candarines and cashes. The tale is divided into 10 maces, 100 candarines, or 1000 cash.

Mr. Pigou then gives an account of the numerous frauds and deceptions practised in the tea trade.

In the Bohea district, when tea is dear, and probably the same is practised in the other districts, the old and hard leaves are gathered, they are steeped in hot water, and then prepared as usual, after which they are pounded and mixed with other teas, in the proportion of five or six catties to ninety-five of good tea.

The Chinese have also several modes of changing Bohea into green tea; for this purpose, they use the coarse Ankoi, the larger leaves of which are selected; ten catties of these are softened in water, or an infusion of tea, when the leaves are somewhat expanded, they are placed on a heated stove, with a small quantity of powdered *chico*, (a magnesian stone,) and proceeded with as before. The last part of the operation is to sift it. If it is not yet sufficiently green, it is again put on the stove; these processes give the green tinge.

The Ho-ping already described, and which is a Bohea, is often changed into a green, resembling the Leoo-ching, also spoken of. It is then sold at Canton for Singlo. All these manufactured teas, as they may be termed, as well as those of bad quality, are generally mixed with the finer sorts for exportation.

The differences observed in teas depend on the soil. As to the modes of preparation, they appertain to the manufacturer, and are the fruit of his skill, and often of his caprice; sometimes he neglects his fire, as well as other steps of the process; sometimes from economy, he employs wood, and even green wood instead of charcoal, or makes use of straw or other substances, for the inferior qualities. The season also, has much influence on the qualities; they are always best when the temperature is mild.

The Chinese at Canton also endeavour to sell all their teas as fresh, striving to give them this appearance, either by mixing with really fresh tea, or by again stoving them.

It is calculated that of one hundred Chinese, forty only are enabled to drink tea, the remainder using water alone. Many of these latter, after their rice is cooked, fill the cooking utensil with water, and as some of the rice has become

burnt, it imparts some colour and taste to the fluid, which is then used instead of tea.

Properties. The Chinese consider the old Bohea as good, they make use of it in fevers to produce perspiration, and they sweeten with an impure sugar, to which they add a little ginger.

Old Hyson is said to be efficacious in obstructions of the stomach from indigestion. When a sense of weight is felt a few hours after a meal, the infusion of Hyson is salutary.

Names. Bohea is pronounced *Voo-yee*, which is the name of the district.

Congo, *Cong-foo.* This tea requires great care in the gathering and preparation of the leaves.

Peko, *Pe-how.* This is the young leaf, whilst still white.

Souchong, *Se on chong*, (a good thing.)

Oo-ching. From its place of growth.

Ho-ping. do. do.

Ho-nan. do. do.

An-koi. do. do.

Sing-lo. do. do.

Hyson. He-tchune. First gathering.

Quantity of Tea gathered in China, yearly.

Singlo	50,000 peculs.
Hyson	4,000
Lonk-ann, or small leaves not exported,	20,000
Mo-i-shan, not exported, . .	2,000
Bing	2,000
Phow-go, a kind of Bohea, . .	2,000
Bohea, including Congo, Peko and Souchong, . .	120 to 130,000
Ankoi, and varieties of green tea,	50,000
Openg . . .	15,000
Ing-ann, a kind of Bohea . .	400
Cow-lou, made into Bohea or Slingo,	2,000
Loot-sien	2,000
	269,400

Journ. de Chim. Med.

ART. XXXVI.—ON THE QUANTITY OF WATER CONTAINED IN CRYSTALLIZED BARYTES AND STRONTIA. By RICHARD PHILLIPS, F.R.S.L. & E. &c., Lecturer on Chemistry at St. Thomas' Hospital.

DR. DALTON in his Chemical Philosophy (vol. i. p. 523.) states that he found that 80 grains of fresh crystallized barytes, dissolved in water and saturated with sulphuric acid, gave 36 grains of dried sulphate of barytes; and hence he infers, that in the crystals 20 atoms of water are united to one atom of barytes. On looking into chemical works I do not find that any other chemist has attempted to ascertain the quantity of water which these crystals contain; indeed Dr. Dalton's statement is quoted by both Thomson and Turner.

Not remembering any case in which a binary compound like barytes unites with so many as 20 equivalents of water, and as Dr. Dalton admits that his experience on the crystals of barytes has been limited, I was induced to repeat the experiment, in order to ascertain whether or not these crystals formed an exception to what appears to me to be a general rule.

With this intention I decomposed some sulphate of barytes by heating it with charcoal, and dissolving the sulphuret of barium in water: the solution was heated with peroxide of copper, and filtered while hot. On cooling, crystals of barytes were plentifully obtained, which were dried, as well as they could be, by repeated pressure between folds of blotting-paper. One hundred parts of these crystals were supersaturated with muriatic acid, and the solution was decomposed by sulphuric acid: in one experiment 72.19 parts and in another 72.15 parts of sulphate of barytes were obtained, giving a mean of 72.17; now as 116 of sulphate of barytes contain 76 of the earth, 72.17 parts contain 47.28 of barytes, which, deducted from 100, the crystals employed, leave 52.72 as the quantity of water which they contained. Now a compound of

$$\left.\begin{array}{l}\text{1 equivalent barytes } 76\\ \text{10 equivalents water } 90\end{array}\right\} \text{give} \left\{\begin{array}{l}45.8\\ 54.2\end{array}\right\} \text{in } 100.$$

which agree sufficiently well with my experiment to show that the crystals contain only 10 equivalents of water, instead of 20 as stated by Dr. Dalton.

According to Dr. Hope, the crystals of strontia contain 68 per cent. of water, and Dr. Dalton concludes from this statement that they contain 12 equivalents of it. I prepared some crystals of strontia in the same manner as those of barytes above described; they were dried in a similar mode, and taking the mean of two experiments, which differed but very little, 100 parts of the crystals, after saturation with muriatic acid and treatment with carbonate of ammonia, give 51.57 of carbonate of strontia; and as 74 of this substance consist of 22 of carbonic acid and 52 base, 51.57 contain 36.24 of strontia, which, deducted from 100, the crystals experimented upon, leave 62.76 as the quantity of water contained in them. The crystals are therefore evidently composed of

1 equivalent of strontia 52, or 36.62
10 equivalents of water 90, or 63.38
} in 100.

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and resemble those of barytes with respect to the quantity of water they contain.

ART. XXXVII.—ON THE REACTION WHICH TAKES PLACE WHEN FERROCYANURET OF POTASSIUM IS DISTILLED WITH DILUTE SULPHURIC ACID; WITH SOME FACTS RELATIVE TO HYDROCYANIC ACID AND ITS PREPARATION OF UNIFORM STRENGTH. By THOMAS EVERITT, Esq., Professor of Chemistry to the Medico-Botanical Society, &c.

As the decomposition of the ferrocyanuret of potassium by means of sulphuric acid is likely to become the only method by which hydrocyanic acid will be prepared for chemical and medical purposes, on account of the cheap rate at which this salt is now to be had chemically pure; and as in all operations of this sort the more exactly we adhere to the proportions indicated by an accurate knowledge of the nature of the interchange which takes place during the process, the more uniform and satisfactory are the results, and the more do we economize our time, I have been induced to examine very narrowly the above reaction.

(2.) Assuming the composition of the crystallized yellow ferrocyanuret of potassium to be 2 K Cy + Fe Cy + 3 Aq, I find that on boiling it with sulphuric acid in a close vessel, $\frac{3}{4}$ths of the potassium remain in solution as bisulphate of potassa, its cyanogen going off as hydrocyanic acid: the remaining $\frac{1}{4}$th combines as cyanuret of potassium with all the cyanuret of iron to form a yellow insoluble salt: thus,

2 proportions of the crystals.	with	yield as results
4 K, 4 Cy		3 Cy H. which escape as gas.
		3 ($\dot{K}$ + 2 $\ddot{S}$) bisulphate of potassa in solution.
2 Fe, 2 Cy, 6 Aq	6 $\ddot{S}$	3 Aq—free.
		K Cy + 2 Fe Cy, which fall as yellow salt.

Or in numbers:

2 proportions of salt	Real sulphuric acid.	Results.
39.15 × 4 potassium	40 × 6	3 (26.39 + 1) hydrocyanic acid,
28 × 2 iron		3 (39.15 + 8) + 6 (40) bisulphate of potassa.
26.39 × 6 cyanogen		9 × 3 free water.
9 × 6 water		(39.15 + 26.39) + 2 (28 + 26.39) yellow salt.

Hence

2 proportions of salt 212.47 × 2	=	424.94
6 proportions of sulphuric acid 40 × 6	=	240.00
		664.94.

yield

3 proportions of hydrocyanic acid 27.39 × 3	=	82.17
3 proportions of bisulph. of potassa 127.15 × 3	=	381.45
3 proportions of water 9.00 × 3	=	27.00
1 proportion of yellow salt K Cy 65.54 + 2 Fe Cy 108.78	=	174.32
		664.94.

(3,) This was proved as follows:

(*a.*) 212·5 grains of the crystals of ferrocyanuret of potassium were dissolved in two fluid oz. of water, to which were added 600 grains of dilute sulphuric acid of specific gravity 1·179, containing 20 per cent. of real acid, and therefore amounting in all to 120 grains real acid; the mixture was kept boiling in a vessel partially closed to prevent the free ingress of air, till the odour of hydrocyanic acid ceased to be given off; the yellow salt collected, washed, and dried at 220°, weighed in Experiment No. 1, 88·1 grs.; No. 2, 88·0 grs.; No. 3, 87·1grs. The calculated number is 87·16. The salt is very liable to assume a delicate green tint unless the air be very carefully excluded from the vessel, and hence its true colour cannot be seen, unless the flask, previously to adding the acid, be filled with carbonic acid gas: the green tint always goes off on drying it at about 300° F.

(*b.*) The colourless solution which passed the filter, leaving the yellow salt on it, and which contained the bisulphate of potassa, required, to render it neutral, of crystallized bicarbonate of potassa, (I used this as being the most definite and manageable salt we have,) in

Experiment No. 1, 152.1; No. 2, 151.0; No. 3, 150.6 grs. The calculated quantity is $1\frac{1}{2}$ ($\dot{K}$ + 2 $\ddot{C}$ + 1 Aq) 150.58 grs., showing that three proportions of sulphuric acid had taken up only $1\frac{1}{2}$ potassa. After neutralizing the liquid with bicarbonate of potassa, it was in two cases evaporated to dryness, and the neutral sulphate weighed, which confirmed in both cases the above results, and proved that no other salt was in the solution: also, in one case, the sulphuric acid was

precipitated by nitrate of barytes, which proved that all the sulphuric acid was in the solution.

(*c.*) The hydrocyanic acid given off was estimated by taking 106.3 grs. of the ferrocyanuret of potassium in two fluid ounces of water, + (300 grains of dilute sulphuric acid of specific gravity 1.179) = 60 grains of real acid, and by means of a tube and cork conducting the vapour into a large receiver, containing a dilute solution of nitrate of silver: the cyanide collected and weighed, gave in

Exp. No. 1, 103 grs.; No. 2, 102.3 grs.; No. 3, 101.4 gr. The calculated number is 100.8 grains. Most likely in experiment No. 1, the matter was not perfectly dried; but the three come sufficiently near to leave no doubt of the theoretical quantity.

(4) Hence I conceive that the exposition of the reaction given at the commencement of this paper is fully proved. I am well aware that in the 46th volume of the *Annales de Chimie et de Physique*, p. 77, M. Gay Lussac states that a white salt is produced during this reaction. I have operated with distilled sulphuric acid, conducted the process in a narrow-necked flask, into which a stream of carbonic acid passed during the whole of the boiling, and it was always of a light lemon colour: in ordinary cases, when this extreme care was not taken, it was greenish. Perhaps M. Gay Lussac poured strong sulphuric acid on the powdered crystals, when a very complicated change takes place. (See Thomson, 7th edition, vol. ii. p. 251.) M. Gay Lussac also states, that after making a few experiments on the new salt, the results appear ("*semblent*," showing that he trusted more to the pen than the balance,) to lead to the consequence that it is a compound of 9 cyanogen, 7 iron, and 2 potassium, so that supposing we have enough of the original ferrocyanuret of potassium to yield 14 proportions of potassium, 7 of iron, and 21 of cyanogen, then by boiling with sulphuric acid, 7 proportions of iron, + 2 potassium + 9 cyanogen fall, 12 of cyanogen go off as hydrocyanic acid, and 12 of potassium are dissolved by the sulphuric acid. Now, I prove by (*b.*) that the relation of the potassium dissolved by the sulphuric acid to that pre-

cipitated is as 3: 1, and not as 6: 1; by (*c.*) that the relation of the cyanogen disengaged as hydrocyanic acid is to that in the precipitate as 1; 1, and not as 12: 9. And the quantity of yellow salt produced in (*a.*) serves to confirm both the above results.

The theory of the subsequent conversion of the salt into Prussian blue, by moistening it with dilute sulphuric acid and exposing it to air, is consequently unknown. I have not yet examined the precise change which takes place, with sufficient care to give an opinion: that potassa is dissolved out, and that the action of free oxygen is essential to the change, is certain.

(5.) Had I examined Gay Lussac's paper before I began my experiments, his high authority would have made me consider any further experiments on this subject as useless; but as I had finished the experiments marked Nos. 1 and 2, before I saw his paper, I was induced to repeat my experiments with redoubled care: hence the series No. 3, and hence their nearer approach to the calculated numbers. I must therefore conclude that M. Gay Lussac has operated on the salt obtained by the action of concentrated sulphuric acid on the crystals. The change in that case, according to Thompson, is so complicated that sulphurous gas, ammonia, carbonic oxide, azote, are given off. I doubt if any definite conclusions can be drawn from it.

(6.) The best proportions, therefore, of the ferrocyanuret of potassium and sulphuric acid to be used when we want hydrocyanic acid are as follows. To every 212.47 grains of the crystals dissolved in about 2 fluid ounces of water, add so much dilute sulphuric acid as shall contain 120 grains of real acid, and by conducting the distillation carefully, 41 grains of hydrocyanic acid pass off, and that I find with the first third of the water: of course the water must be put into the receiver and kept very cold. But no process for procuring a dilute solution of hydrocyanic acid, in which distillation or filtration is had recourse to, will yield an acid of uniform strength, however carefully the process may be conducted, not even, as I have proved, if the receiver be sur-

rounded with ice. Hence the *absolute necessity* of assaying in all such processes, the ultimate product, either by the nitrate of silver or the peroxide of mercury method; the first is to be preferred: we have the great advantage that any error committed in collecting, drying, and weighing, is reduced to one-fifth in estimating the quantity of real acid, 100 grains of the cyanide of silver corresponding to 20.38 of hydrocyanic acid.

(7.) In addition to the very elegant application of the nitrate of silver for detecting the presence of free hydrocyanic acid in its passage as vapour from a dilute solution, or in any plant containing the acid, (thus, masticate a bitter almond, put it in watch-glass, and cover it with a bit of glass, on the under surface of which a drop of dilute nitrate of silver is placed; in a few minutes the cyanide of silver is formed,—an experiment which may serve as a class illustration of the extreme volatility of the substance,) recommended by Mr. Barry in the London and Edinburg Philosophical Magazine, vol. iv. p. 151. Mr. Barry has also put me in possession of a means as elegant for the testing of the presence of minute quantities of hydrochloric or sulphuric acid in hydrocyanic acid, viz. Put some of the acid on a watch-glass, add two or three drops of liquor ammoniæ, put the glass on the sand-bath, and evaporate to perfect dryness, when all ammonia and hydrocyanic acid pass off, leaving only, if any hydrochloric or sulphuric acid be present, a little hydrochlorate or sulphate of ammonia behind; a drop or two of distilled water will dissolve these, and by nitrate of silver added to one-half, and nitrate of barytes to the other, the presence or absence of the above acids will be determined. If the hydrocyanic acid be quite pure, the watch-glass after evaporation is scarcely soiled, and water dissolves nothing: this method is far preferable to that by means of carbonate of lime usually recommended.

(8.) In a paper which I read to the Medico-Botanical Society, on Tuesday, Dec. 9, 1834, on the methods of assaying medicinal hydrocyanic acid, I stated that I had examined samples of the acid procured from various shops in town, and

that the frightful difference of strength had induced me to make the results known, with a view of calling the attention of the medical profession to the evil. Thus, samples from Allen, Hanbury and Co., yielded 5·8 per cent.; from Apothecaries' Hall, at different times, from 2·1 to 2·6 per cent.; and from several sources I found acid containing only 1.4 per cent. These samples I procured from the several shops personally, and asked for Scheele's strength. They were assayed within 24 hours after they were in my possession, both by the nitrate of silver and the oxide of mercury method, and the results in no cases varied more than one-tenth of a grain from each other. Now, it is true we have no fixed standard, and therefore it is impossible to say whether Allen and Co.'s is too strong or the others too weak; but this much is certain, that if a medical man were pushing the exhibition of hydrocyanic acid gradually to a maximum dose, the prescriptions being carried to a shop where the acid had only one-fourth per cent. and then by some accident or other cause taken to where Allen's acid was used, a sudden, and I fear a fatal increase would be the result, for more than a triple quantity would be taken. For the possibility of a fatal accident, I need only refer to the case of seven individuals near Paris being killed by a slightly increased dose, recorded in all the medical periodicals a few years since.

(9.) On the same evening I called the attention of the members of the Medico-Botanical Society to the method for procuring medical hydrocyanic acid recommended by Dr. Thomas Clarke, by cyanide of potassium and tartaric acid; a method which can now be employed by any one, since Mr. Laming has brought into the market a very pure salt. From very numerous trials, I find that the procuring of this salt, the cyanide of potassium perfectly pure, must be expensive; and I have never been able to procure it strictly in this state without using alcohol to crystallize it from: and many chemists, I find, (see Mr. Barry's paper above alluded to,) object to it, from its being so excessively deliquescent, and hence rather unmanageable, and also to the liability of this highly poisonous salt being mistaken for other white salts on their

counters. This latter objection, I must say, is hypercritical; if people will be careless, there is no means of preventing mistakes, and I conceive the objection of Mr. Barry applies with tenfold force to many arrangements of a druggist's shop, where we often see tincture of opium flanked right and left by other dark tinctures; and who that has manipulated has not caught himself laying hold of, and using one acid, &c. for another, when the mind is also at work?

(10.) I have made many trials as to the practicability of applying the cyanide of silver and dilute hydrochloric acid for procuring medical hydrocyanic acid. The cyanide of silver presents many advantages: it is perfectly stable, being neither affected by light nor moisture; its purity can be very easily ascertained, and every five grains of it will yield one grain of acid. It can be procured by conducting the vapour from the process described in section (6.) of this paper, into a pint of water, holding 255 grains of nitrate of silver, washing and drying at 212°. It yields 201.6 grains of white cyanide. I should recommend that the bottle containing this salt be accompanied by a small stoppered phial with dilute hydrochloric acid of such strength, that one minim will exactly decompose one grain of the cyanide: thus, suppose one corked phial having 200 grains of cyanide with one ½ oz. stoppered bottle with hydrochloric acid of specific gravity 1.129, this would be enough to make five fluid ounces of dilute hydrocyanic acid, of the Dublin strength, if the following formula be followed. Into a phial capable of holding rather more than one fluid ounce, put forty grains of the cyanide, add seven fluid ounces twenty minims of water, and forty minims of the dilute hydrochloric acid; cork closely, shake several times for the first quarter of an hour, set aside to allow the chloride of silver to fall, decant the clear liquid into another bottle, to be preserved for use: every fluid drachm will contain one grain of real hydrocyanic acid.

The only objection I had *a priori* to this process, was the liability of a little free hydrochloric acid remaining in the solution, since all books echo that the presence of a minute quantity of the mineral acids very much hastens the decom-

position of this acid; a statement perfectly opposite to fact, at least as far as concerns hydrochloric acid. I prepared four ounces of hydrocyanic acid perfectly pure by distillation off chalk; to two ounces I added five drops of hydrochloric acid; the other two ounces in another phial were left perfectly pure, both inverted and placed in a glass case, so as to have diffused light during the day. After three weeks the pure acid had become quite brown, and a considerable quantity of solid deposit had formed; the other remained quite limpid and colourless, and on actual trial was found to contain nineteen-twentieths of the acid which it had at first. Mr. Barry also informed me that his fourteen years' experience led to the same result; and that, being aware of this, he adds purposely a little hydrochloric acid to all his medicinal acid. Perhaps some may object to the price of the preparation: a case containing the two bottles with 200 grains of the cyanide would leave one-half profit if sold for 5*s.*; this brings an ounce of acid to 1*s.*, and where so small a quantity is used, surely this cannot be a very weighty objection, if a uniform article can be secured.—*London and Edinburg Philosophical Mag.*

ART. XXXVIII.—ON THE PREPARATION OF MERCURIAL OINTMENT.

By M. Coldefy Dorly.

The possibility of promptly killing mercury by prepared lard, having been doubted, I have the honour of sending to the Society of Pharmacy a specimen of axunge, by which twenty-four to thirty-two times its weight of mercury can be extinguished in a few minutes.

About five years since, I laid before the Society a series of manipulations, among which was the following, and which I preferred.

After having melted the axunge, it is to be poured in a

small stream into a large vessel of cold water, to divide it; it is then to be placed on a somewhat coarse hair seive, and kept in a dry place, protected from dust. In about fifteen or twenty days, it will be found capable of extinguishing seven or eight times its weight of mercury, and this property goes on increasing as it acquires more rancidity and viscosity, so that in a few months it will promptly act on thirty-two times its weight of mercury.

I leave it to more experienced chemists to explain why the same axunge, under other circumstances, and even appearing to be more rancid, does not act in the same manner. There is so much difference of opinion on this subject, that I will abstain from mentioning my views, and will merely give facts.

℞	Prepared axunge	℥ij.
	Mercury	lbs.iij.

They are to be rubbed together in a moderate sized mortar, having an ovoid bottom. If the axunge is too hard, a small quantity of olive oil is to be mixed with it; the mercury disappears in four or five minutes, and the mixture assumes a pearl gray colour. *Journ. de Pharm.*

Miscellany.

Chinese Vermillion.—The *Nouveau Journal Asiatique* contains a translation by M. Stanislas Julien from a Chinese encyclopedia, giving a full account of the preparation of vermillion. After stating that the best is found native in Mayang, and is used for painting the houses of princes and persons of distinction, it goes on to give the process for making it from crude mercury. A crucible of porcelain, or a double vessel of metal is employed indifferently for this purpose; to one pound of mercury, two pounds of sulphur are added; the mixture is triturated until it forms a blackish powder; it is then put into a crucible, which is covered with an iron plate held down by a transverse iron bar firmly attached to the vessel. All the openings are carefully luted and the pot placed upon an iron tripod, under which a fire of resinous faggots is maintained for a considerable time; whilst the cover is kept cool by means of an old swab soaked in water. The mercury combines with the sulphur and sublimes in a fine powder. The vermillion on the inside of the cover is the brightest. One pound of mercury gives fourteen ounces of vermillion of the first quality, and three and a half of the second. When intended to be used in writing, it is ground with gum water, and made into small cakes. Rubbed upon a stone pallet it presents a red of the greatest brilliancy; if pounded on a tin slab, it forms a black colour, and is then fit for the varnishers and gives to objects a glistening tint which enhances their price. Mixed with the oil of the *Thoung* tree it is very brilliant, but the addition of the varnish destroys this and gives it a dark black colour.

Journ. Asiatic Soc. Bengal.

To separate magnesia from potassa and soda.—M. J. Liebig proposes the following plan for this purpose as more simple than any hitherto described. It is specially designed to recognise the presence of sulphate of soda in sulphate of magnesia. With this view, the sulphate of magnesia is precipitated by the sulphuret of barium, which separates all the magnesia from the soda; this latter remains in the fluid in the state of sulphuret of sodium, mixed with an excess of sulphuret of barium, by neutralizing with sulphuric acid, evaporating and heating to redness, the

quantity of sulphuret of soda is obtained. This plan will answer when the alkalies and magnesia are combined with other acids. It sometimes happens that when an excess of sulphuric acid has been used, and afterwards ammonia in excess added, that the solution from which the magnesia was precipitated by the sulphuret of barium, on the addition of phosphate of ammonia becomes somewhat turbid, this turbidness is owing to lime, from which magnesia is rarely exempt. The use of caustic barytes instead of the sulphuret gives the same results.

Journ. de Pharm.

Ambergris.—It is said that ambergris is the intestinal concretion of the whale, and generally the produce of disease. The bills of cuttle fish or rather the smaller sepia, are frequently found in ambergris, from which one might suppose that they may enter into the formation of ambergris. And I was very much struck with the peculiar odour evolved on drying some cuttle fish, having a faint trace of musk, or more properly speaking, of ambergris; and the carbonaceous matter particularly, produced the smell. A tendency to putrefaction heightens the odour: and several of the officers as well as myself recognized the fragrance for which ambergris is valued.

Webster's voyage to South Atlantic, Vol. 1.

Cape aloes.—In our rambles on shore we found the plant from which the cape aloes are extracted. It appears to be abundant, although neglected. It is from three to six feet in height; and, when grown has a moderately thick woody stem, sending forth numerous flowering branches on all sides. The bark is brown; and the flowers assume the form of a spike in an erect position, and of a dense scarlet colour. The leaves are fleshy and ovate, and the wood has no concentric rings. The leaves of this shrub are cut, and thrown into a sheep skin on the ground. In this state the liquor is allowed to drain from them; it is afterwards poured into a copper, in which it is evaporated, the remainder, forming the aloes of commerce.

Ibid.

Cockroaches.—Sailors have a notion that soy is made from cockroaches, because the Chinese at Canton have a large soy manufactory, and they are particularly solicitous to obtain cockroaches from ships, from which circumstance sailors immediately conclude that it is for the purpose of making soy of them. Captain Wm. Owen, well known for his scientific attainments, states that the Chinese use cockroaches as bait in their fishing excursions, and that they answer the purpose admirably. I was also informed by him that the infusion of cockroaches is a most powerful antispasmodic, and is useful in tetanus, and that his surgeon in the Eden, Dr. Birnie, had used it with beneficial effect. I am aware that in some

warm climates this infusion has been used with advantage; but Dr. Hall has tried it at Maranham, in a case of tetanus, without any beneficial result. At Bermuda it is used as an antispasmodic in whooping cough, with reputed benefit. I always kept some strong tincture of cockroaches by me in climates where tetanus is of common occurrence. Happily, however, I had no cause for trying its effects. In the course of my experiments on the infusion of the cockroach, I could not but notice that common salt and water saturated with the juices of these animals, had all the odour and some of the flavour and qualities of soy, so that the opinion of the sailors as to its composition, may not be far from the truth.

Ibid.

Codeine.—M. Merck has obtained this substance in a very simple manner by treating morphine precipitated by soda, with cold alcohol, saturating the tincture with sulphuric acid; distilling to get rid of the alcohol, diluting the residue with cold water, till the solution becomes clear, filtering, and evaporating till the liquid assumes a syrupy consistence, introducing it when cold into a large flask with a certain quantity of ether, then adding an excess of caustic potash, and shaking the mixture for some time. The ethereal fluid becomes so highly saturated, that the codeine is deposited in a crystalline form in a few hours, on evaporating the ether and treating the residue with alcohol, the codeine will gradually be obtained in a state of purity, totally exempt from an oil, which has always been a great obstacle to its crystallization.

Journ. de Pharm.

Tonic collyrium for chronic opthalmia.—

℞. Acacia seeds ℥ss.
Rose water ℥vi.

Infuse the seeds in a glass or porcelain mortar, adding the rose water in small quantities at a time, and filter. This solution is to be used to wash the eyes, and also to be applied during the night, by means of compressers.

Ibid.

Cantharides.—M. Piette of Toulouse states that the best mode of preparing these insects, is to place them alive in a large vessel, and to moisten them by a small stream of essence of lavender or of any other of the labiate plants. This soon kills them, after which they are to be dried in a stove. By this plan, they preserve a beautiful green colour, and are not subject to the attacks of mites, thus preserving all the cantharidine.

Ibid.

Extract of aconite in acute rheumatism.—Dr. Lombard of Geneva, has employed the extract of *Aconitum napellus* with great success in acute rheumatism. This extract is prepared from the expressed juice of the

fresh plant, previously coagulated and filtered, and then evaporated in a water bath; the watery extract thus made, is dissolved in alcohol and again evaporated to a pillular consistency by a gentle heat.

By administering this remedy in doses of a quarter to half a grain twice a day, and gradually augmenting the dose to six or nine grains a day, M. Lumbard has found that the pain and swelling rapidly disappear. No unpleasant symptoms were produced, except when a very large quantity was taken,(one drachm and a half in twenty four hours) in this case a great cerebral excitement was induced.

Ibid.

Tapioca.—Dr. Perrine has given the following particulars respecting this article. According, says he, to honest Bernal Diaz, the name of the peninsula of Yucatan, is indicative of the prevalence of the Jatropha manihot, and is derived from two native words, signifying *Cassave land.* The Maya Indians, who constitute four-fifths of the population, still call the root Yuca, the place of its growth Tal; and etymology has been unusually careful in merely changing Yucatal into Yucatan. When prepared for bread, this pulp is denominated cassava; when the paste is passed through holes to granulate it for exportation, it has taken the name of tapioca. There are two species cultivated, the *acrid* and the *sweet*, but the difference is no more visible to the botanist, than that of the sweet and sour orange trees. The natives, however, easily recognize the Yuca agria along side of the Yuca dulce, and in case of doubt do not hesitate to decide by tasting. The Yuca dulce is brought to the table like yams, and is eaten, boiled or roasted, like the common potatoe. The Yuca agria, besides supplying cassava cakes for the food of the healthy at home, and tapioca grains for the nourishment of the sick abroad, is also converted into pure starch, both for domestic consumption and foreign exportation. However thickly the ground be covered with stones, if there be in every two or three feet square, two inches of earth to insert the cuttings of the Yuca stem, the labour is done and the crop secure. Each cutting should have at least three buds, and is inserted obliquely, leaving one germ in the air to shoot up into a stem, and the other two below the surface, to spread in the shape of creeping roots. In Yucatan the lowest computation of pure starch produced is at the rate of 2500 pounds to the acre, and 4000 pounds is not admitted to be a very extraordinary crop. The cheapness of its production may be inferred from the fact, that pure Yuca starch is actually selling at Campeachy at three dollars and a half the hundred pounds, although its transportation on mules from the distant interior, amounts to half that sum.

Amer. Jour. of Med. Sciences.

Artificial Ultramarine.—M. Robiquet gives the following process to prepare a blue colour, resembling that of the artificial ultramarine of

Guimet, though it is not so intense. Introduce into a stone ware retort, coated with clay, a mixture of one part of kaolin, one and a half parts of sulphur, and one and a half parts of dry and pure carbonate of soda; then heat gradually, as long as any vapours are disengaged, let the retort cool, break it, and there will be found in the interior a spongy mass of a very fine green colour, but on attracting moisture from the air, it passes gradually to a blue. Wash the mass; the excess of sulphate dissolves, and there remains a very beautiful blue. Wash by decantation, dry and calcine again at a cherry red heat, to expel the excess of sulphur.

Ann. des Mines & Amer. Journ. Sci. & Arts.

Reduction of chloride of Silver.—The best mode of reducing the chloride of silver, is that of Mohr, which consists in mixing the chloride with one third of its weight of rosin, and heating the mixture gradually in a crucible, until the flame loses its blue colour: after which, a strong heat is applied to melt the reduced silver.—*Erdmann. Jour. and Idem.*

Mode of preparing Smaltz in Sweden.—The cobalt ore is roasted until most of its arsenic is expelled, after which a sufficient quantity of concentrated sulphuric acid is mixed with it to form a thick paste, which is exposed to a moderate heat at first, and afterwards heightened to a cherry red, for one hour. The sulphate thus obtained is reduced to a powder, and dissolved in water; and a solution of carbonate of potash added to it in a gradual manner, in order to separate the iron, and when it is perceived by the blue colour that the cobalt is thrown down, the supernatant liquid is decanted and filtered, and the cobalt precipitated by a solution of silicate of potash, which is prepared by heating in an earthen crucible, a mixture of ten per cent. of potassa, fifteen of well pulverized quartz, and one of charcoal, and treating the melted mass with boiling water.

Dict. Tech. and Idem.

Purification of Water.—In order to precipitate the earths mechanically suspended in water, it is recommended to employ the silicate of potassa, gelatinous silica or phosphoric acid. The last is an excellent reagent for throwing down the oxide of iron, without introducing any foreign principle in the water.

Ann. des Mines and Idem.

Balsam Copaiva. Mr. Webster says that at Para, the balsam copaiva is esteemed a capital vermifuge in large doses, and is sometimes used to mix paint with; it gives work the appearance of being varnished. The seeds are large and black, and are kept in apothecaries' shops as an astringent; they contain a quantity of oil, and some hydrocyanic acid. The tree is very large and lofty, and is used for timber.

Voyage to South Atlantic, II.

Mangrove. The same author states that the wood of the red mangrove (*Rhizophora,*) is an excellent firewood, burning well even in a green state. Boats sent to obtain it are always much stained, and a ship's deck becomes reddened by it. The bark is a good astringent, and is used for tanning. It is of a red colour internally. The simple infusion of the bark is of a light red colour, somewhat like a mixture of blood and water. A solution of iron does not blacken it, but rather deepens the colour; alum has scarcely any effect. An alkaline infusion is of a vivid blood red colour, which dyes cloth of a permanent red brown. The alkaline infusion, in drying, concretes in a gummy mass, retaining all the fine colour of the solution. Neither the simple nor the alkaline infusion show the least disposition to fade, but preserve their virtues for a considerable time. *Ibid.*

Capara guareoides.—This fine plant, according to Mr. Webster, furnishes a large quantity of seeds or nuts, of a nauseous and bitter subastringent taste. The capsule in which they are contained is nearly two inches in diameter, and covered with a gummy exudation. The seeds yield, by grating, a quantity of starch or fecula, but the chief use is for making oil. For this purpose the seeds are put into warm water to steep, to separate the husk; they are then beaten into a paste, and made into balls, and exposed to the sun on an inclined plane; the oil exudes and runs into a trough. After which they are boiled in water to extract any remaining oil, which, however, is of an inferior quality. This oil is bitter and stimulating; it is the general lamp oil of the country, is used in the manufactory of soap, is a good remedy for the itch, and is superior to any known substance for making the hair grow. *Ibid.*

Purgative for children.—

R	Oil of Croton tiglium	gtts.ij.
	White sugar	ʒij.
	Gum Arabic	ʒss.
	Tinct. cardamom or cinnamon	ʒi. ʒij. M.

This mixture is given in doses of two tea spoonfuls every three or four hours, until the desired effect is produced. It has an agreeable taste, and may be given without danger to the youngest children, taking care to proportion the dose to the age. *Journ. de Pharm.*

Iodic Acid.—This may be obtained on a large scale, by the following process: Put one part of recently prepared iodine into a matrass with a large neck, to which a long tube of about two lines in diameter is fitted, make a mixture of eight parts of nitric acid with one and a half to two parts of nitrous acid, and pour upon the iodine enough of the mixture to dissolve a half or two thirds; afterwards apply a mild heat and gently

agitate the vessel to throw down the iodine which has condensed on its neck; after a few minutes add a new dose of acid, and proceed in this way until all the iodine has disappeared. Then pour the whole into a capsule of porcelain, and the iodic acid is deposited. But it will be yellow, and in order to have it perfectly white, it must be dissolved in distilled water, filtered, evaporated, and when sufficiently concentrated, once or twice its volume of pure and fuming nitric acid added to it, in order to precipitate the iodic acid. Decant the mother water, wash the acid once or twice with a little nitric acid, redissolve the residue in three times its weight of distilled water, and add to the solution two thirds its volume of pure nitric acid, and evaporate to dryness in a porcelain capsule upon a sand bath, when very beautiful and perfectly crystallized iodic acid will be obtained. *Jour. de Pharm.*

Zittman's Decoction.—This nostrum once enjoyed great repute in the cure of syphilis, but fell into disuse; it has, however, been lately revived, and great encomiums bestowed on its powers, in this and other diseases.

℞. Rad. Sarsaparill ℥xii
concis. infund. in lebete stanneo C. aq. font Ms. xxiv.
Sacchari aluminis,* ℥iss
Merc. dulcis, ℥ss
Cinnab. antimon. sublim. ʒi
coque, donec supersint Ms. viij et subfin. coct. add.
Sem. anisi
Sem. fœnic. aa ℥ss
Fol. Sennæ ʒiij
Rad. Liquirit ʒiss
ebullit. decoc. exorta redundatis evitetur. Coletur d. ad. decub. viij. S. Decoctum fortius.
℞ Specibus residuis demio addantur
Rad. Sarsaparill contus ʒvj
coque C. aq. font. Ms. xxiv. sub finem coct. add.
Cort. citri
Cardom. minor
Rad. Liquirit aa ʒiij
colentur lb. xvj d. ad. ʒviij S. Decoct. mitius.

The treatment is to begin with a cathartic of calomel and jalap. Next day the patient is to take eight ounces of the strong decoction warm, and remain in bed. At noon he may rise, and at one, take a pint of the weak decoction cold. At night, eight ounces of the strong decoction cold. This course is to be pursued for four days. On the sixth, another ca-

* Equal parts of sugar and alum.

thartic, and the decoction for four days as before. On the 11th, the course terminates by another cathartic. Should the cure not be complete, the entire course, or half of it, must be repeated, at an interval of eight days. The most rigid diet must be observed. After the cure, the patient must remain in the house for some time, on low diet, returning very gradually to his usual mode of living. Some practitioners advise a still more rigid discipline, the patient being confined to bed during the whole treatment, and a full pint of the strong decoction, warm, given in the morning, and the same quantity of weak in the afternoon; with the same attention to diet. *N. Am. Arch. of Med. & Surg. Sci.*

Carbonate of Soda.—Prukner gives the following process. Commence by changing the calcined sulphate of soda into sulphuret of sodium, by treating it to redness with pulverized charcoal. Dissolve the sulphuret and add oxide of copper to the warm solution. Filter and evaporate until the specific gravity = 1.41 or 1.48. On leaving the solution for twenty-four or forty-eight hours, the undecomposed sulphate of soda crystallizes. Evaporate the supernatant fluid to dryness. This process gives about sixty-five of crude caustic soda for one hundred of sulphate of soda. To convert this into carbonate, heat gradually to redness with charcoal. Metallic copper, as well as its oxides, may be used to separate the sulphur from the sulphuret of sodium; but on the large scale, the protoxide is preferable. In order to procure this oxide, heat metallic copper to redness and plunge it into water containing 0.002 of the nitrate of soda of Chili. The sulphuret of copper derived from this manufacture, mingled with one-sixth of powdered sulphur is easily transformed into a sulphate by washing. *Ann. Schweigger. & Amer. Journ. Sci. & Arts.*

Best mode of administering Oil of Turpentine.—A writer in the London Medical Journal proposes the following formula for the administration of this article:

℞ Ol. Terebinth ℥iss. vel ℥ij.
Magnes. Carbon. ℥i. Tere et adde.
Aqua Menth. sativ. ℥v.
Syrup limonis,
Spt. lav. comp. aa ℥ij.
M. et div. in haust iv. capt. j, ter quotidie.

N. A. Arch. Med. & Surg. Sci.